MILLENNIAL

494

pages of

RESEARCH
EDUCATION
BUSINESS
INNOVATION

UNC CHARLOTTE

CHARLOTTE RESEARCH INSTITUTE

BUSINESS COACH

CRI's DEVIN COLLINS on entrepreneurship + new position at CRI

FOCUS ON...

PostDocs mission to find new cancer treatment

MILLENNIAL

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COVER: PHOTO TAKEN FROM PORTICO OF THE BIOINFORMATICS BUILDING OVERLOOKING GRIGG HALL.

UNC Charlotte Charlotte Research Institute

FEATURES

Dr. ROBERT WILHELM

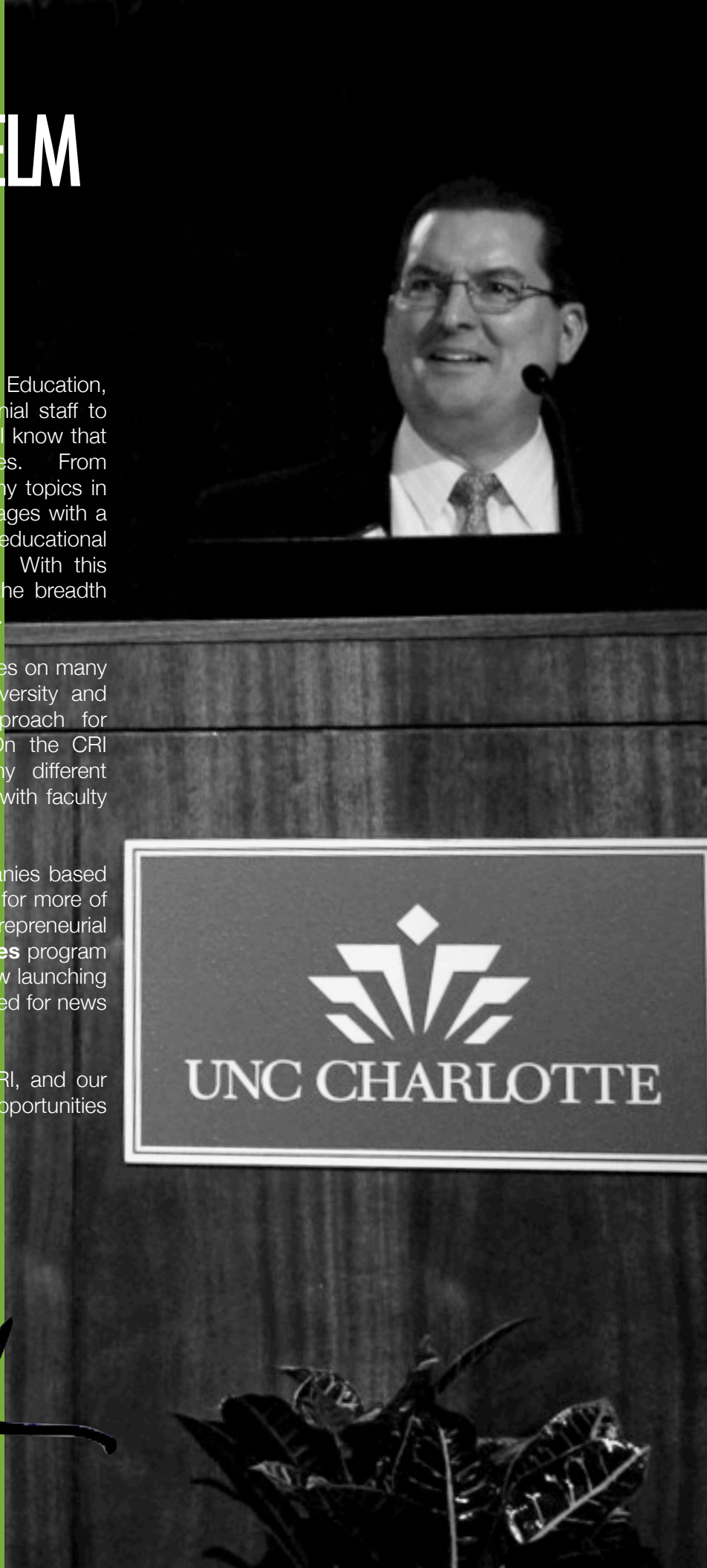
Letter from the Executive Director

WOW! This issue has 60+ pages of Research, Education, Business and Innovation. I asked our Millennial staff to work on a comprehensive survey, but little did I know that even this summary would be over 60 pages. From Bioinformatics to Precision Metrology with many topics in between, the Charlotte Research Institute engages with a significant collection of research centers, educational efforts, and organizations at UNC Charlotte. With this issue we hope you will come to appreciate the breadth and depth of research activity at UNC Charlotte.

Interleaved with research summaries are updates on many of our business partners. This mix of university and company information is similar to our approach for attracting companies to UNC Charlotte. On the CRI campus, companies are collocated in many different buildings, collaboratively working side by side with faculty members, expert staff, and students.

A number of our business partners are companies based on UNC Charlotte ideas and inventions. Look for more of these startup companies as we gear up our entrepreneurial programs. Building on a very strong **5 Ventures** program this year, for new business startups, we are now launching the 2012 Charlotte Venture Challenge--stay tuned for news on this initiative.

Thanks for your interest in UNC Charlotte, CRI, and our research initiatives. We look forward to new opportunities for collaboration and compelling results.



1. ESTRADA, INNOVATOR

Dr. Juan Estrada continues to reach for the stars

The Charlotte Research Institute and the University of North Carolina at Charlotte organized a free public lecture by Duke Energy Distinguished Speaker Juan Estrada, a nationally renowned physicist at Fermilab and one of the principal investigators on the Dark Energy Survey, a high-profile experiment aimed at probing the oldest and most distant parts of the universe. The event that was open to the public was held on Wednesday, March 23, 2011, at UNC Charlotte's James H. Barnhardt Student Activity Center Salons. Estrada spoke on "The Accelerated Expansion of the Universe and the Tools We Are Building to Understand It". The Dark Energy Survey is a Fermilab research project aimed at answering some of the most fundamental questions about the nature of the universe by building and operating a unique long-wavelength light telescope that will have the ability to record galaxies that are more distant and older than any that have yet been detected. The event was a highlight for students and aspiring researchers from UNCC and around the area who attended this session. Estrada, a famous physicist with a Ph.D. from the University of Rochester, has various recognitions under his belt. In 2010, the U.S. government awarded him a Presidential Early Career Award for Scientists and Engineers, the highest award the country gives to younger scientists and engineers. Estrada was honored at the White House for "…widely-recognized contributions to high-energy physics and particle astrophysics experiments, and (for) his invention of a new detector concept that can extend searches for dark matter particles into a range not covered by existing experiments; and for actively involving high school science students and teachers in this research."

The two day visit started with a coffee hour to meet the distinguished physicist where a number of students and faculty participated. The second day comprised a luncheon followed by the public lecture by Juan Estrada. More than one hundred people attended the lecture and heard the latest research and findings related to dark matter and dark energy. Faculty and students from the physics department enjoyed the lecture which was culminated by the speaker fielding questions from the audience.

2. ENCOURAGE

The largest, professional conference for biomedical and behavioral students known as the Annual Biomedical Research Conference for Minority Students (ABRCMS) held its tenth conference at Charlotte, North Carolina. This four-day conference was held on November 10th to 13th, and it attracted 2,800 individuals; including 1,500 undergraduate students, 300 graduate students and postdoctoral scientists and 1,000 faculty and administrators. Students and Faculty from more than 285 colleges and universities across the US were present for the event. All those who presented are pursuing advanced training in the biomedical and behavioral sciences, including mathematics, and had conducted independent research.

The conference is designed to encourage underrepresented minority students to pursue advanced training in these fields, including mathematics, and to provide faculty mentors and advisors with resources for facilitating students' success. More than 280 representatives from graduate programs at US colleges and universities, as well as scientists from government agencies, foundations, and professional scientific societies, joined ABRCMS in the exhibitors program to share information about graduate school and summer internship opportunities. These representatives presented research opportunities, funding sources, and professional networks information. During the four-day conference, 1,200 students participated in poster and oral presentations in ten disciplines in biomedical and behavioral sciences, including mathematics. All undergraduate student presentations were judged and those that received the highest scores in each scientific discipline and in each educational level were awarded prizes during the final banquet.

This conference is known as a key stepping stone to enhancing the scientific and professional development of young scientists. After participating in ABRCMS, all students are strongly encouraged to attend professional society meetings of their respective disciplines to continue their scientific and professional development.

3. SURVIVE ANOTHER ROUND

SAY IT LOUD SAY IT PROUD
1. Judges at semi-finalists event
2. Semi-finalist providing a succinct business overview
3. Expectators providing queries to presenters

Questions were of the essence at this March 16 Five Ventures 2011 semi-finals presentations event. For-profit and Social Enterprise Five Ventures semi-finalists expanded on their business ventures, plans, goals, and aspirations. After a swift business overview, semi-finalists had the opportunity to field queries from participating judges. Finalists were announced on March 18. Contestants initially benefited from participation in three workshops. Semi-finalists were selected based on written submissions and upon selection were offered another workshop in preparation for semi-final oral presentations. The finalists were supplied with a mentor team consisting of some of our region's leading entrepreneurs and business leaders. Those companies that made it through this process were introduced to our community on April 14th and competed for cash prizes.

4. PRODUCT DEVELOPMENT MGMT.ASSOC

pdma

Connecting Innovators Worldwide

Product Development Management Association organized their annual "Innovate Carolina Conference" on the UNC Charlotte campus in Charlotte, NC on April 15th, 2011. The conference was highlighted as "Open Innovation - Buzzphrase-du-jour or viable product development tool?" tried to unpack that very question during the one day conference. The conference had a full-day of networking and engaging discussions. Unlike other conferences that tackle this topic, this conference aimed at listening to the Product Development leaders speaking about real-world case studies, including stories from the field about:

- How ideas from outside a firm are generated and collected through contests, trend spotting, and tech scouting.
- How Open Innovation concepts should be evaluated and managed differently from internally-generated concepts, and what happens when they aren't.
- How an open innovation process fits in a traditional product development culture.

Some of the renowned keynote speakers for the conference included, Louis Foreman of Enventys, David Magellan Horth from the Center for Creative Leadership, and Dr. Gene Slowinski from the Graduate School of Management at Rutgers University.

5. T.I.M.E

The 13th annual **Quality Conference** was held on April 11-13, 2011, in conjunction with UNC Charlotte at the Embassy Suites in Charlotte, NC. The 2011 Quality Conference was all about exploring Test, Inspection, Measurement and Evaluation practices in manufacturing. Focusing on the most important topics related to test, inspection and measurement, this Conference delivered a truly unique and intimate platform on advancing the manufacturing industry. Featuring 45 minute presentations over 2 and 3 day tracks, plus multiple workshops, the Quality Conference delivered top-notch education through case-studies and hands-on professional examples. The widely attended event, full of hands-on technology updates, real-world insights and strategies, received many guests from different industries, professionals and new talent. The conference was attended by corporate managers, vice presidents, quality managers and engineers, NDT technicians, supervisors, manufacturing managers or engineers, plant supervisors, quality technicians, and calibration laboratory managers from around the area. Some of the past Quality Conference attendees included representatives from Accurate Technology, Massachusetts Institute of Technology, UNC Charlotte, Wilcox Industries and many more.

For more information visit: *www.qualitymagconference.com*

6. 5 VENTURES

UNC Charlotte, Charlotte Research Institute, the Ben Craig Center and the **Office of Technology Transfer** presented the **10th Annual Five Ventures Business Innovation Competition** on Thursday, April 14, 2011. The competition consisted of two categories: 1.) Student Ventures and 2.) For-Profit and Social Enterprise Ventures. Contestants benefited from participation in three workshops that are designed to help entrepreneurs complete an opportunity assessment and build a written summary of the business. Semi-finalists were selected based on written submissions. Upon selection, those invited to go on to the next step were offered another workshop in preparation for semi-final oral presentations. An elite group of student and non-student finalists was selected. The finalists were supplied with a mentor team consisting of some of the region's leading entrepreneurs and business leaders. Those companies that made it through this process were introduced to the community on April 14th to compete for the cash prizes and in-kind services. Over 250 attendees converged at UNC Charlotte's Barnhardt Student Activities Center to celebrate 10 years of business innovation in Charlotte. The event featured dynamic presentations by five student and six non-student finalists. Mike Elliott, Managing Partner of Noro-Moseley Partners, a leading Southeastern venture capital firm, shared entrepreneurial success insights at the event, followed by a reception and networking event in the evening.

Known for its history, Five Ventures® has helped many of the region's innovators and entrepreneurs to grow their businesses. Every year contestants work for four months to prepare and compete to be selected as a finalist to present at the Five Ventures event, and some of them are awarded with the recognition as truly extraordinary early-stage companies.

For more information visit:
www.charlotteresearchinstitute.com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HELLO ENTREPRENEURSHIP
1. Registration table, Lolita Gonzales (middle)
2. Grand prize winners MailVu accepting their prize from Dr. Robert Wilhelm (left) & Devin Collins (right)
3. Gregory Kintz from Laser Biopsy, Inc.
4. Dr. Lopa Das Roy (left), Dr. Pinku Mukherjee (middle), Dr. Jennifer Curry (right) from CanDiag, LLC
5. YEA student volunteers

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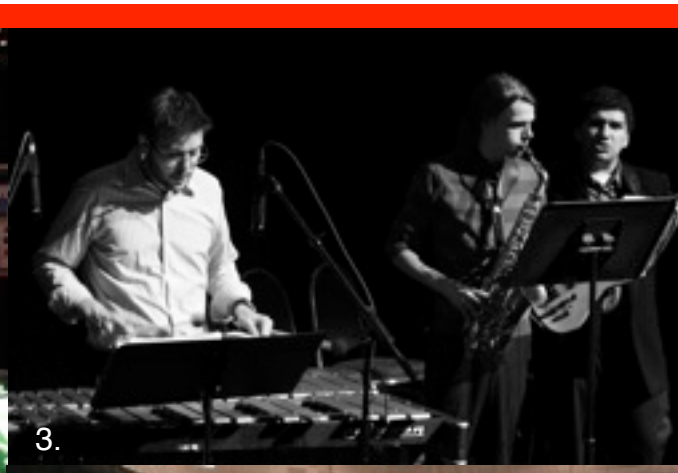
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7.NANO

The 3rd Annual NCNCC (NORTH CAROLINA NANOTECHNOLOGY COMMERCIALIZATION CONFERENCE) was held at Barnhardt Center, UNC-Charlotte, NC on March 29 - 30, 2011. This year's annual conference provided a venue for networking with fellow professionals and keeping up with the cutting edge of nano world. The conference featured a National-level keynote speaker; technical sessions, workshops, and exhibits showcasing the latest advances in the field; discussions on financing, licensing, and business development geared toward the nanotech entrepreneurs; sessions and exhibits showcasing cutting-edge research, products, and technologies; student poster competition; and networking opportunities.

Some of the Keynote speakers included Travis Earles, Assistant Director for Nanotechnology at the White House Office of Science and Technology Policy, Michael Bolick, President, Lab 21, Ltd., personalized medicine diagnostic specialist supporting healthcare providers, the pharmaceutical and biotechnology industries, and Doug Jamison, CEO of Harris & Harris, a publicly traded venture capital firm exclusively focused on investing in companies enabled by nanotechnology and microsystems.

One of the many workshops organized during the two day conference included a workshop called Nanobio workshop. This workshop was about the Actionable Strategies for Company Building & Moving to Market. This workshop was an add-on to the established North Carolina Nanotechnology Commercialization Conference, which is hosted by the North Carolina Department of Commerce, in partnership with Charlotte Research Institute, the Small Business and Technology Development Center, and the Center of Innovation for Nanobiotechnology (COIN).

BIO AFFAIR

1. Travis Earles, Assistant Director for Nanotechnology at White House Office of Science and Technology Policy
2. Conference reception area
3. UNC Charlotte student band
4. Conference reception area
5. Dr. Robert Wilhelm, Associate Provost for Strategic Research Partnerships &Executive Director of CRI

5.

closeup

business coach

As sunlight profiled Devin Collins face, his straight to the point answers underscored his entrepreneurial spirit. The Babson College graduate and Assistant Director for Business and Entrepreneurial Development at the Charlotte Research Institute at UNC Charlotte joined the CRI team in December 2010.

With a bachelor's degree in Business Management and a concentration in Entrepreneurship from Babson College, his curiosity began to carve its innovative path when "I was able to take (specialized) entrepreneurial courses," says Collins who also holds a master's degree in International Affairs from American University's School of International Service.

Now an experienced entrepreneur, Collins has spent much of his career working in or with early-stage start-ups. Prior to joining CRI, Collins was a strategy consultant with RAM Consulting, Inc., where he worked with a group of former CEOs and CFOs accelerating the growth of domestic and international small-to-medium enterprises. Before joining RAM, Collins founded Innervate Systems, an early-stage new venture creation company that launched his first startup BrainGoals (Brain Fitness Systems) and has since worked with over 100 start-ups developing business plans, infrastructure, financials and pitch presentations.

According to the Kauffman Foundation, more than half of the companies on the 2009 Fortune 500 list were launched during a recession or bear market, along with nearly half of the firms on the 2008 Inc. list of America's fastest-growing companies. "The economy should not dictate your willingness to start a business" says Collins, "instead this is when innovation takes place." For a majority of entrepreneurial novices taking the first step is developing a business plan, but Collins explains "before you even start a business plan you need to assess the merits of the opportunity and then decide to move forward" a few points to consider for those just starting out are:

- Is this an idea or an opportunity?
- Are you an entrepreneur, and if so what type?
- What is the opportunity's competitive profile?

By infusing his naturally given entrepreneurial knack with CRI, Collins is set to embark in several major projects. First on his list, the 10th Annual Five Ventures Business Competition. (Thursday, April 14, 2011). Collins alongside UNC Charlotte, the Charlotte Research Institute, the Ben Craig Center and the Office of Technology Transfer hosted a series of workshops to help assess the opportunity of each participants business idea. Collins will also be focusing his efforts on identifying potential high growth startup opportunities, as well as licensing and industry partnership relationships.

Currently Collins is based at CRI's branch office at the North Carolina Research Campus (NCRC) in Kannapolis, he also allocates a portion of his time at the Ben Craig Center. In conjunction with the Life Sciences Program Manager at CRI Clare Cook Faggart, Collins also helps market the Bioinformatics Center at NCRC and has working relationships with other UNC Charlotte groups such as Senior Design.

By focusing on a field that embraces people who choose to pave their own road to business success, Collins serves as a coach guiding startup business founders through a maze of entrepreneurial challenges.

Interested persons should contact Collins at:
Tel: 704-250-5753
or Devin.Collins@uncc.edu

For more information concerning the 10th Annual Five Ventures Conference visit:
www.charlotteresearchinstitute.com

Dr. Lopamundra Das Roy

INSPIRING DISCOVERY

Amidst elaborate laboratory equipment that overwhelms even the most discerning eye, Research Assistant Professor Dr. Lopamudra Das Roy is helping discover new ways to detect and treat cancer. Originally from Assam, India, Dr. Das Roy had always wanted to do cancer research, and in step with her aspirations she received her Doctoral Degree in Genetics in 2007. She started her cancer research career by joining Irwin Belk Endowed Scholar for Cancer Research and Associate Professor Dr Pinku Mukherjee's Immunology laboratory in 2007 at The Mayo Clinic School of Medicine in Arizona as a post doctoral fellow.

The US Department of Defense funded Dr. Das Roy's breast cancer and pancreatic cancer research project to "Study the influence of arthritis on breast cancer associated metastasis." She studies the incidence and the immunological mechanisms of metastasis in the lungs and bones of mice with a) autoimmune arthritis that are induced to develop breast carcinomas, and b) spontaneous breast cancer that are induced to develop autoimmune arthritis. She has established that breast cancer associated metastasis is significantly increased with arthritis and has identified the key cytokines associated with the enhanced metastasis and is now finding ways to therapeutically target those. These studies are novel, as the connection between arthritis and breast cancer metastasis had not been made.

Also focusing on pancreatic cancer, Dr. Das Roy studied the oncogenic role of MUC1 Cytoplasmic tail (CT) and identified a direct role of MUC1 in initiating epithelial to mesenchymal transition during pancreatic cancer. MUC1 is a transmembrane glycoprotein that is over expressed and aberrantly glycosylated in greater than 95% of metastatic pancreatic ductal adeno-carcinoma and is associated with poor prognosis.

It is said that success does not just happen; the individual has to work hard to attain their ultimate goal. Expect to see great strides towards understanding, identifying, and treating breast and pancreatic cancer from Dr. Das Roy.

Dr. Jennifer Curry

RIGHT ON TARGET

Postdoctoral research fellow Dr. Jennifer Curry's roots have grown far beyond the place she calls home. Originally from Ohio, Dr. Curry has delved into cancer research with a zest that is driven by her ambition to help find out more about this potentially debilitating ailment.

Concentrating on pancreatic and breast cancer, the Susan G. Komen funded professional with her background in immunology is researching the role inflammation and MUC1 (a protein) play in cancer progression and metastasis. Currently working under Irwin Belk Endowed Scholar for Cancer Research and Associate Professor Dr Pinku Mukherjee, Dr. Curry along with fellow postdoc Dr. Lopa Das Roy are looking at an approach to deliver compound drugs directly to a tumor site which in turn reduces the effects of systemic treatment. This is achieved using an antibody specific to MUC1, a protein that is highly expressed in a mutated form in breast and pancreatic cancer. The goal is to first induce an immune reaction against MUC1 using vaccine therapy and then deliver drugs that will turn off the tumor's ability to stop the immune response. MUC1 is present on both primary tumors and metastases so this treatment has the exciting potential to eliminate breast and pancreatic cancer from the body.

In continuing her research by contributing copious amounts of effort and skilled diligence, Dr. Curry will keep working on ways to detect and treat pancreatic and breast cancers.

research & federal Relations

UNC Charlotte is committed to providing the infrastructure and support needed for its faculty and researchers to pursue their research, creative, and service activities at the highest levels. The University's Office of Research and Federal Relations (RFR) works to promote scholarly inquiry and nurture research efforts that enhance the curriculum, extend or create knowledge, and serve the greater Charlotte region.

Headed by Vice Chancellor for Research and Federal Relations Dr. Stephen Mosier, RFR provides such support and other services, which include helping faculty obtain resources, establishing partnerships that facilitate academic discovery, and managing external sponsored program awards.

In order to provide comprehensive services, RFR includes the following offices:

- **Technology Transfer** works to identify, protect, and commercialize university research and intellectual property. Contact: Carl Mahler, Executive Director; Tel: 704-687-8016; cmahler@uncc.edu
- **Proposal Development** provides consultation services to faculty who are developing grant proposals. Contact: Lesley Brown, Director; Tel: 704-687-4330; labrown@uncc.edu
- **Research Services** is the central administrative office for managing proposal submissions, contract negotiation, budget preparation and award acceptance. Contact: Ellen Zavala, Director; Tel: 704-687-2592; eezavala@uncc.edu
- **Research Compliance** is responsible for facilitating and monitoring university-wide compliance with federal and state policies established to ensure ethical conduct in research. Contact: Dixie Airey, Director; Tel: 704-687-3311; dsairey@uncc.edu
- **Research Cost Management** provides transactional support to college-based post-award staff and is responsible for overall sponsored program financial reporting and compliance. Contact: Kevin Hyatt, Manager of Award Management, Tel: 704-687-3853; khyatt3@uncc.edu

RFR represents faculty interests both inside and outside the University, including developing research and service partnerships that use the expertise and interests of faculty and staff to address the needs of the Charlotte community and region.

The UNC Charlotte Office of Technology Transfer is one of the country's best in putting intellectual capital to work, successfully leveraging a strong tradition of applied research and a progressive stance on licensing to transfer technology to the marketplace. The Office's commitment to economic development has resulted in the formation of companies, jobs and the addition of millions of dollars to the economy.

For more information visit: http://www.uncc.edu/landing/research

FOCUS

OFFICE of technology transfer

1.

2.

ENTREPRENEURIAL LEADERS
1. Carl P.B. Mahler II, Executive Director
2. Bradley Fach, Assistant Director
3. Ruth Burnett, Associate Director
4. Andy Gonzales, Administrative Assistant

3.

4.

Visions, ideas, and inspirations embedded into your psyche by a groundbreaking innovative invention often need intellectual property protection in order to withstand the test of bringing an idea to market. UNC Charlotte's Office of Technology Transfer (OTT) identifies, protects, and commercializes university research and intellectual property. The office works closely with faculty, students, and staff to help bring new technology and innovation to market.

Spearheaded by Executive Director Carl Mahler, OTT prides itself in providing services that guide people through an arduous and often perplexing process. The team, Associate Director Ruth Burnett, Assistant Director Bradley Fach, and Administrative Assistant Andy Gonzales keep this small yet distinctive office running at full speed.

Currently, between Fiscal Year (FY) 2000 to 2008, OTT has placed UNC Charlotte on the map by qualifying for top placement in national rankings in the Association for University Technology Managers (AUTM). Additionally within the same period, OTT received 462 new invention disclosures, filed 341 patents, issued 57 patents, formed 26 start-up companies, and created 162 new jobs. The process usually begins with "figuring out a market value for the invention" says Mahler, it's "never too early to come talk with us" notes Fach.

OTT, in collaboration with the Charlotte Research Institute (CRI), recently launched a new fund to build prototypes for inventions created at the University. The fund provides a maximum of $3,000 per invention and must be used exclusively for product design and development. This opportunity paves the way for future inventors to accelerate commercialization.

The Office of Technology Transfer is also involved with the local entrepreneurial and technology licensing community. Brad Fach and Ruth Burnett helped start a local chapter of the Licensing Executive Society (LES). Based in Washington D.C., the Licensing Executive Society promotes the business advancement of intellectual property globally. With 30 locations in the United States, the Charlotte Chapter holds regular meetings where LES members and outside speakers give presentations on topics relevant to technology transfer and licensing. As a resource to licensing professionals in the region, LES gives an insight into the current trends. For more information regarding this group and the activities that they hold contact Fach at 704-687-8018, or bfach@uncc.edu.

Bringing to light new ideas, concepts, or points of view can be tricky if not guided by an experienced professional. OTT has and continues to promote responsible licensing practices in addition to guiding inexperienced innovators through a field of possibilities.

For more information visit:
http://research.uncc.edu/tech-transfer

Senior Design

At UNC Charlotte, The William States Lee College of Engineering Senior Design Program guides engineering students to excel through hands-on experience by collaborating with industry partners. The industrial/multi-disciplinary program encompasses real-world engineering projects with a collaborative research environment, and in turn, pivotal professional experience.

Senior Design projects solve engineering problems defined by industrial sponsors or by faculty. Design teams are assigned based on the disciplines required. The teams spend one semester understanding the problem and developing a concept. During the second semester the teams typically build prototypes or full scale versions of their designs. Projects are ushered through the process by a faculty mentor who provides feedback that ultimately lends itself to a rewarding learning experience. These mentors:

- Ensure the students are regularly talking to the sponsor.
- Assist the student group with technical decisions and design.
- Participate in reviews, along with the sponsor (Project Requirements; Project Plans, Project Financials, Project Design, Status Reports).
- Grade the student work by filling out assessment forms using simple rubric forms provided.
- Authorize team purchases. Verify the item is needed by the team. Receive parts for the team.

By partaking in the Senior Design Program firsthand, Mechanical Engineering senior Michael Hayes has been able to apply the skills learned to his co-op with Duke Energy. In the program students are expected to "produce solid engineering concepts that will lend themselves to a real-world environment" says Hayes who has been offered and accepted a position with Duke Energy.

A hybrid of real-world experience combined with a classroom setting has and continues to provide a new perspective on the path aspiring professional engineers go through to attain ultimate success.

Companies wishing to sponsor Senior Design projects should contact the Program Director Bill Heybruck at 704.687.2934 or WFHeybruck@uncc.edu

For more information visit: www.srdesign.uncc.edu

CHANGING TIMES

kushal sarkara recounts his experience at cri, and his post-graduation plans.

Within his two year tenure Kushal Sarkara has gained valuable experiences through the Charlotte Research Institute. Hired as a student worker in 2009 Sarkara saw immediate potential "CRI needed somebody who could perform day-to-day tasks using MS Office, Outlook, etc. Mrs. Karen Ford (CRI Executive Assistant & Office Manager), in particular, was also excited about the fact that I was familiar with Adobe Photoshop."

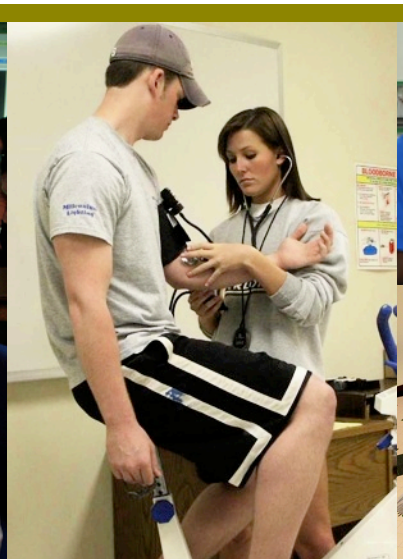
With an undergraduate degree in Electronics and Telecommunications Engineering from the University of Mumbai under his belt, Sarkara is currently pursuing and on the verge of completing a Masters in Electrical Engineering. His "thesis deals with wireless sensor networks and I am using my programming skills and telecommunications experience to get these sensors to interact with each other, with the aim of building networks whose prospective applications include environment sensing and logging and systems monitoring."

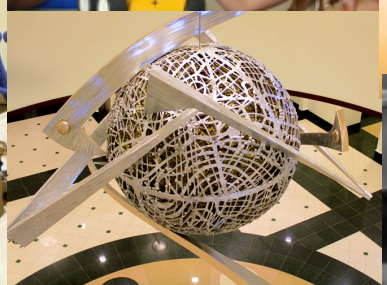
Set to graduate during the 2011 fall session Sarkara is looking forward to placing his learned skills to good use. After graduation Sarkara hopes "to find a position where I can work on development in the fields of machine-to-machine communications or robotics."

Rounding out an already culturally diverse CRI staff, Sarkara advises future student workers "fortunate enough to be recruited by CRI will have the opportunity to grow as a person apart from learning the skills that the job requires." CRI wishes Sarkara a bright future!.

As a whole these entities thrust research innovation into the twenty-first century.

The Charlotte Research Institute has relationships with a multitude of centers, departments, and initiatives:





mechanical ENGINEERING

Day in and day out we all come in contact with an array of devices engineered to make our life more livable. Mechanical Engineering, a field which prides itself in keeping up with cutting edge design, execution, and production, has given students the vigor to spearhead this field into the twenty-first century.

Mechanical Engineering and Engineering Science at UNC Charlotte is more than a mere career path. Students enrolled in this fast paced program get hands on experience by an infusion of internships, in class tutelage, training in the engineering fundamentals, laboratory experience, and most importantly networking opportunities. Accredited by the Engineering Accreditation Commission of ABET, The William States Lee College of Engineering Mechanical Engineering and Engineering Sciences Department (MEES) offers its students a chance to study a wide range of research programs:

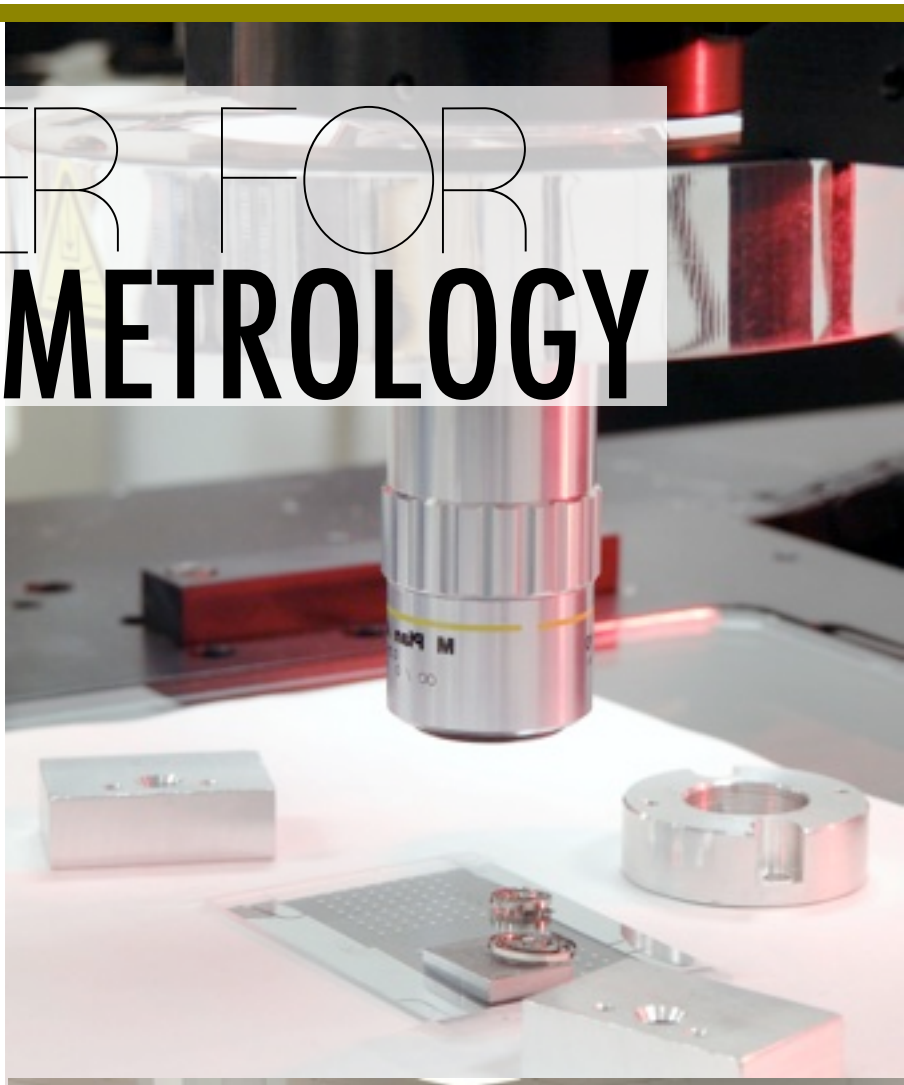
- Bioengineering
- Computational Modeling and Analysis
- Computational Mechanics
- Computational Fluid Mechanics
- Computer Aided Manufacturing
- Precision Metrology and Manufacturing
- Metrology and Tolerance
- Precision Design and Instrumentation
- Manufacturing
- Motorsports and Automotive Engineering

With an increased demand for college graduates to have a hefty amount of hands on experience by the time they graduate, the MEES provides students with career enhancement programs. Working jointly with the UNC Charlotte University Career Center, the MEES encourages its students to partake in Co-ops and 49erships to gain real world engineering experience, to participate in the International Option program which encourages students to travel overseas to gain international competitiveness and international engineering perspective, and to take advantage of the College's Mentoring program, peer-to-peer mentoring, faculty mentoring, learning workshops and supplemental instruction.

MEES at UNC Charlotte has engineered an exceptional curriculum that keeps flourishing with every graduating student.

For more information visit: www.mees.uncc.edu

CENTER FOR PRECISION METROLOGY



UNC Charlotte's centers highlight a variety of topics that ultimately contribute to the spirit of ingenuity. Precision Metrology explores and applies dimensional measurements to manufacturing and other state-of-the-art processes with required dimensional tolerances on the order of ten parts per million. These tolerances, in turn, dictate measurement procedures with uncertainties often on the order of one to two parts per million.

Headed by Center Director Dr. Robert J. Hocken, The Center for Precision Metrology at UNC Charlotte is a graduate of the National Science Foundation Industry/University Cooperative Research Centers (I/UCRC) program, and a current member (with UC Berkeley, MIT, and other institutions) of NSF's Nano-scale Science and Engineering Centers program. The center breaks new ground in the engineering field by addressing real-world industrial concerns that are critical in maintaining a competitive edge in a world economy where trends in all aspects of manufacturing are moving towards higher tolerances.

As is true in any field, when high caliber research is the ultimate goal, a properly equipped research facility is needed. Located on the Charlotte Research Institute Millennial Campus, the metrology suite is composed of a main laboratory, a high-accuracy coordinate measuring machine laboratory, and a precision instrument design and development area. The combined expertise of the research faculty and extensive, excellent facilities place the Center head and shoulders above any other academic metrology facility in the Americas. The capabilities of the Lab include a wide variety of coordinate metrology, surface finish and various traditional dimensional metrology devices.

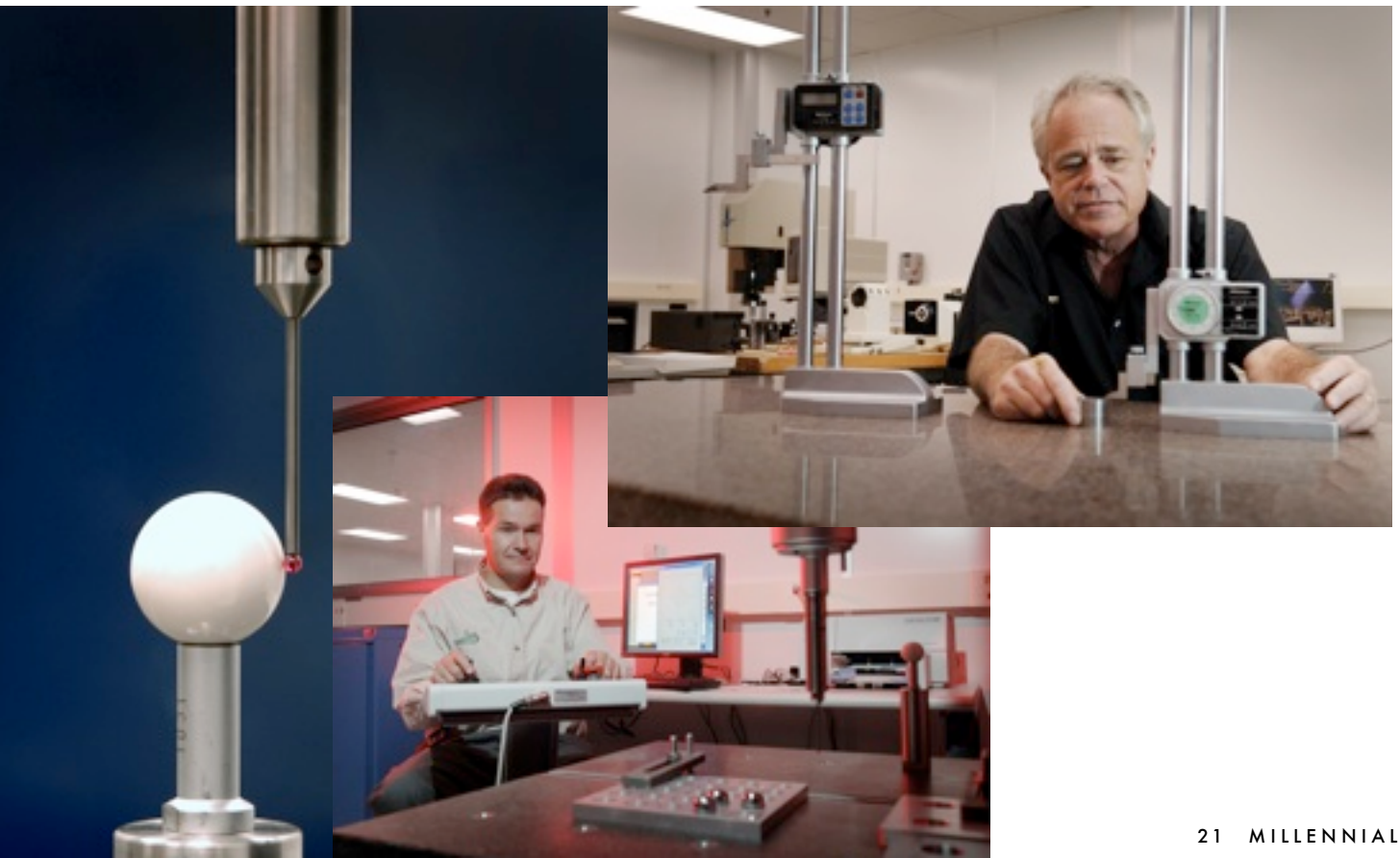
Currently, there are five computer control coordinate measuring machines (CMMs) in the facility with various touch trigger, scanning, and vision based probing systems. In the area of surface metrology, there are a half-dozen contact and non-contact based instruments to measure two and three dimensional surface finish and form. There are also a number of dimensional metrology instruments for measuring form, size, and surface finish including:

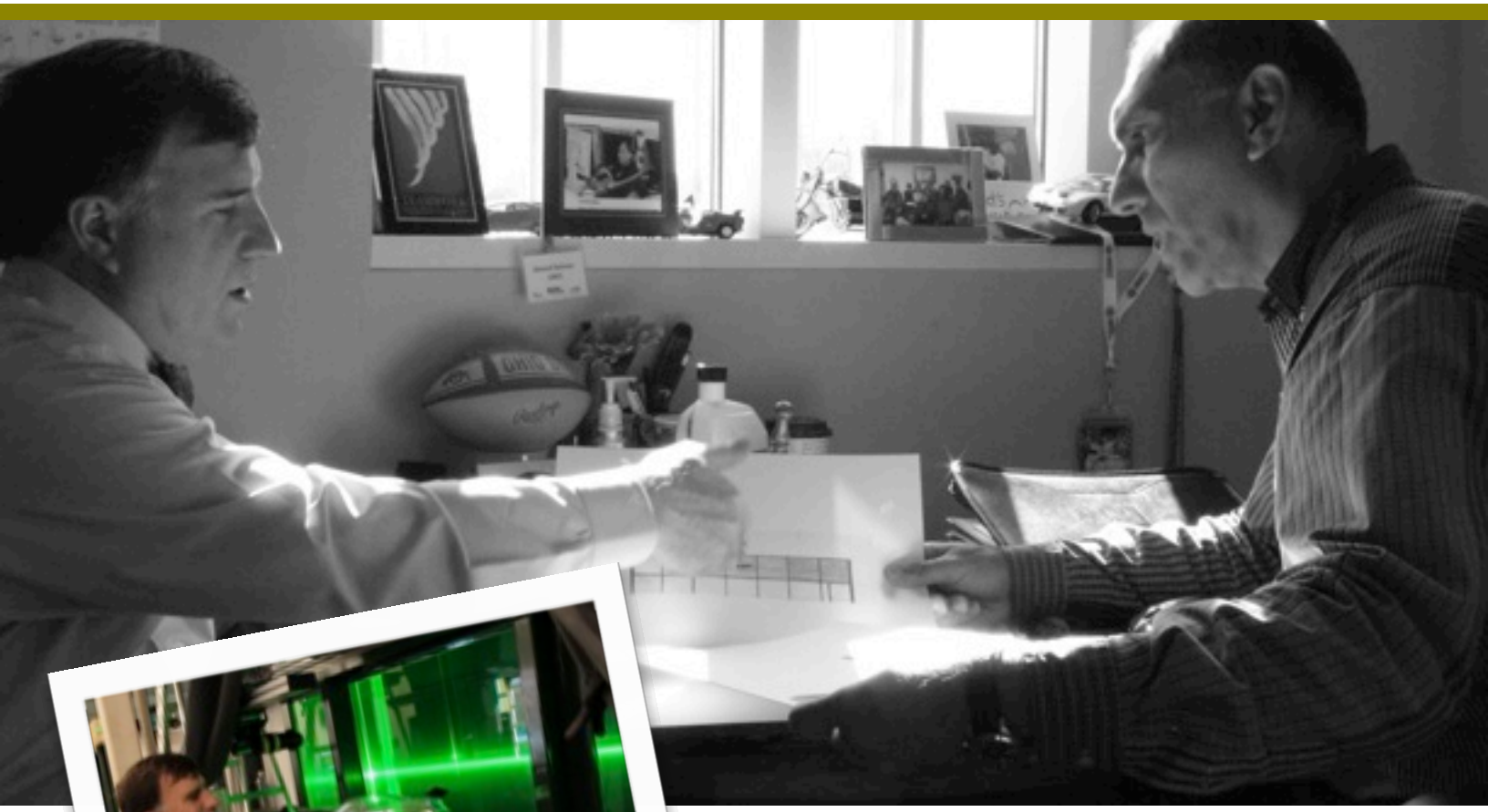
- flatness (both scanning white-light and Fizeau) interferometers,
- roundness/cylindricity instruments,
- Inner Diameter /Outer Diameter gage (1-D measuring machine),
- gage block comparator,
- gage block interferometer,
- measuring microscopes, and
- a variety of manual inspection instruments.

Developed originally as a stand-alone industrial consortium, and later supported as a National Science Foundation IUCRC, the Center for Precision Metrology maintains an industrial collaborative affiliates program with typically 10 to 15 members. The diversity of the members in the affiliates cohort has led to projects spanning scales from computer chip and disk drive components to aircraft and tractor components, all of which require exceptional precision (relative to their overall size) in order to function properly. Membership fees from the affiliates fund both generic and industry-specific manufacturing metrology research projects, primarily through research assistantships for students.

For more information visit:

http://cpm.uncc.edu





MOTOR SPORTS

Gone are the days when Motorsports was but a mere hobby. Today, this multidisciplinary field has grown and keeps growing with the push of innovative enthusiasm. Headed by Associate Professor and Director for the North Carolina Motorsports and Automotive Research Center (NCMARC) Dr. Ahmed Soliman, the Motorsports program at UNC Charlotte brings forth the region's top tier talent with graduates igniting careers that propel this ever expanding field into the twenty-first century.

The Motorsports program has placed "many students into internships with prestigious racing teams," says Assistant Professor of Motorsports Dr. Peter Tkacik. It is estimated that roughly 10 percent of all National Association for Stock Car Auto Racing (NASCAR) engineers are UNC Charlotte graduates. In order to meet the needs of a rapidly growing program, a new building addition will make its Fall 2011 debut. Since its inception, the Motorsports program, part of the William States Lee College of Engineering at UNC Charlotte, has had tremendous success in creating a new era in Motorsports Engineering.

The 6800 square foot Motorsports building, which was built in conjunction with Duke Centennial Hall and houses NCMARC, will expand its facilities. The planned expansion, Motorsports Building II, will add 16,500 Gross Square Feet (GSF). This additional space will house the program's water tunnel which is capable of providing flow visualization experiments in addition to drag and lift measurements.

The anticipated structure will also play host to a small scale wind tunnel, high speed video laboratory, space dedicated to engine assembly and disassembly, computer laboratories, a state-of-the-art engine dynamometer, as well as faculty and staff offices, and support space. The project broke ground on Monday January 24, 2011.

By planning many expansions and additions, the Motorsports program can only accelerate in the years to come. In 10 to 15 years "we hope to be the top Motorsports program in the world," says Dr. Soliman with "a 50 percent increase in students vying for a sought after Motorsports degree."

With research areas running the motorsports gamut, the program covers Advanced Coordinate Metrology, Computational Fluid Dynamics, Finite Element Analysis and Applications, and Advanced Engine Research among many more. Sponsorship for such programs is provided by a variety of companies that embrace the study of automotive engineering (for a detailed list of Motorsport Program Sponsors visit: www.motorsports.uncc.edu/sponsors).

This prestigious program is like none other, with faculty and staff embracing the unlimited possibilities this growing field has to offer, and of which current and future pupils will drive their way to success.

For more information visit: www.motorsports.uncc.edu

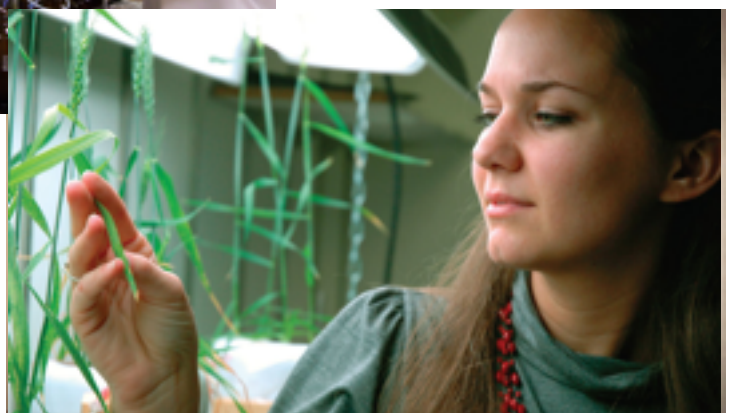
IDEAS

n a new era of initiatives that promote the sustainability of a healthy environment The Infrastructure, Design, Environment and Sustainability Center (IDEAS) at UNC Charlotte has a mission to contribute to framing the challenges, providing leadership and creating the solutions that will accelerate the technical and social shifts needed to make our built environment more sustainable.

Since its inception, IDEAS a Charlotte Research Institute center has brought together more than 50 faculty fellows from a wide range of disciplines including Civil and Environmental Engineering, Mechanical Engineering, Electrical and Computer Engineering, Architecture, Anthropology, Sociology, Philosophy, Psychology, Geography and Earth Sciences, Biology, Chemistry and Business. Together faculty teams formulate proposals, advise graduate students, and respond to research requests from local and regional companies and government agencies.

The IDEAS Center operates with a leadership team that includes the Director Dr. Helene Hilger (Civil and Environmental Engineering); the Executive Director of the Environmental Assistance Office, Regina Guyer; a Research Development Coordinator, Dr. Keith Baarson; a Research Projects Director, Dr. Sandra M. Clinton (Biology Dept.); and two Senior Fellows, Dr. John Daniels (Civil and Environmental Engineering) and Mr. David Vogel. In addition, the Center is guided by an Executive Committee that includes faculty, Research Area Coordinators, a liaison from the Infrastructure and Environmental Systems (INES) Ph.D. program, and the Campus Sustainability Coordinator.

In 2010, the National Science Foundation (NSF) awarded the IDEAS Center a grant to establish a new research center focused on sustainability for sustainably integrated buildings and sites (SIBS). The SIBS Center is being created through the NSF's competitive and prestigious Industry/University Collaborative Research Center (I/UCRC) Program. Both SIBS and the IDEAS Center will foster research by



individual and teamed faculty members that focuses on the specific needs of regional businesses and municipalities.

In addition to buildings and sites, IDEAS research focuses on infrastructure and renewable energy; materials, performance, and verification; and ecosystem dynamics. With expertise in the triple bottom line domains of environment, economics, and social systems, the Center aims to apply twenty-first century solutions to help the region create a more sustainable built environment.

For more information visit: www.ideas.uncc.edu

EPIC

Aiming to unite Industry and Academia for Energy, the Energy Production and Infrastructure Center (EPIC) Building at UNCC campus is on its way to be completed in 2012. The 76 million dollar EPIC Building will provide nearly 200,000 square feet of classroom and state-of-the-art laboratory space to accommodate growth in energy production, distribution and infrastructure research and collaboration with industry partners. In collaboration with previously commissioned architects, LandDesign is providing the civil engineering and landscape architecture services that will make the EPIC Building truly sustainable, fully equipped with the latest in green technology. "EPIC is about regional growth and advancement in the energy industry," said Dr. Steve Patterson, founding director of EPIC and a distinguished professor in the Lee College of Engineering at UNC Charlotte.

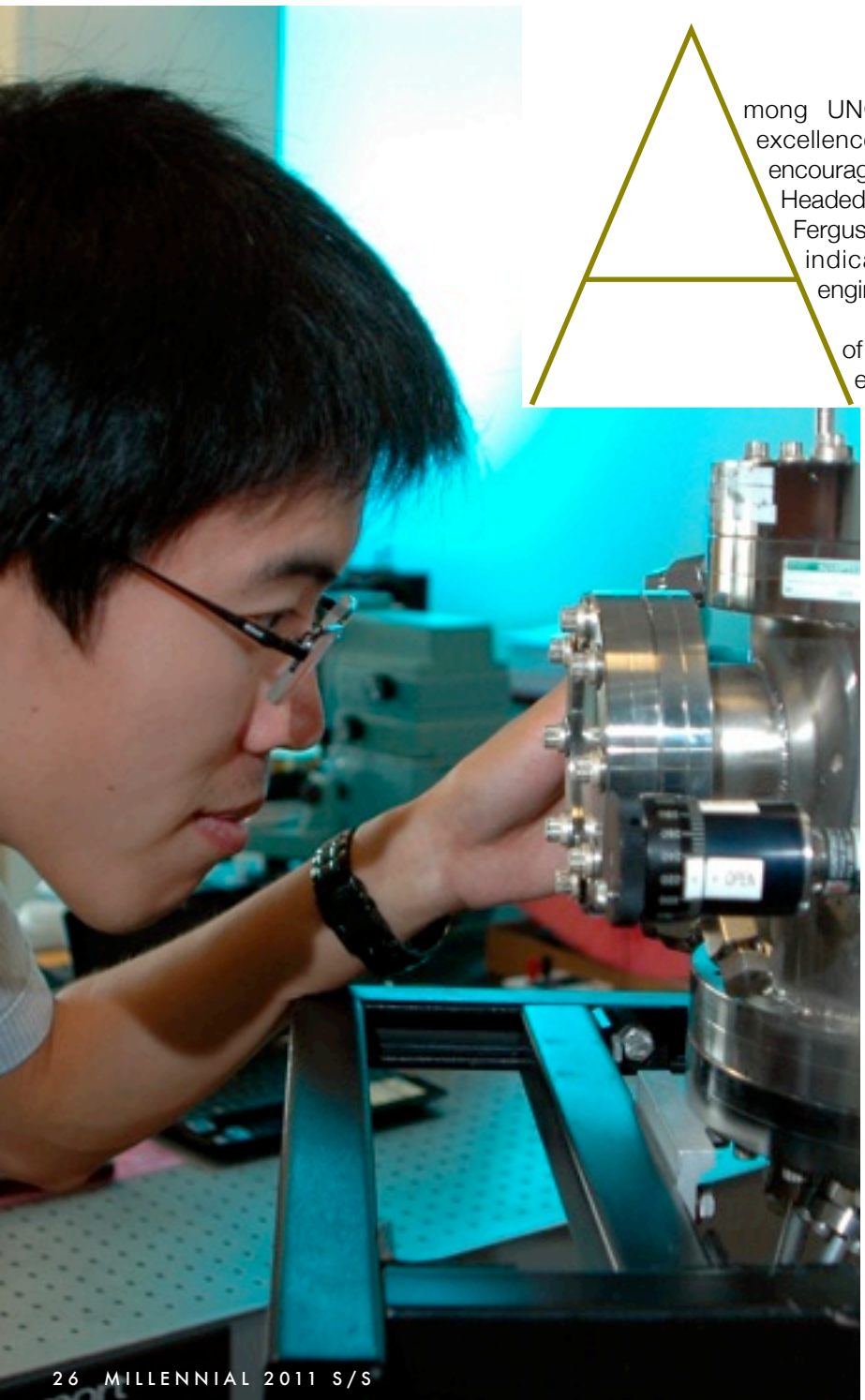
The purpose of EPIC is to train engineers, research emerging technologies, and attract new and expanding energy companies in the Charlotte region. The demand comes as the energy industry faces a workforce crisis at the same time there is the need to build new energy facilities in this country. And UNC Charlotte has a history of supplying professional talent to energy and engineering firms. By 2030, demand for electricity is expected to grow by 40 percent in this country. To meet this challenge, the energy environment is evolving rapidly, with innovations in the works to develop everything from electric vehicles, natural gas, wind, solar and nuclear.

The project received a boost in the spring of 2011 when Duke Energy and Siemens Energy announced a combined $8.8 million in support for EPIC at UNC Charlotte. Duke will contribute about $4.5 million and Siemens $4.3 million over several years as EPIC develops and grows.

The EPIC implementation team will also be addressing a number of new research and technical issues. These include equipment reliability, power delivery, sub stations, air quality, emissions reductions, non-destructive examination, materials and increasing power plant longevity. Dhiaa Jamil is Duke Energy's Group Executive and Chief Nuclear Officer, and chairman of the EPIC advisory board. He is also a UNC Charlotte engineering alumnus. "EPIC will play a significant role in providing engineering students with the fundamentals for supporting power production and infrastructure design and maintenance," Jamil said. "EPIC will train students in power production fundamentals, which will reduce the time needed and costs associated with training new employees. These graduates can start work with an understanding of the industry and associated work. Additionally, EPIC provides Duke Energy with a local partner for research opportunities, Jamil said. "This can include solving technology problems, as well as developing and improving existing technology. EPIC will also have a key role in expanding emphasis on renewable technology and will serve as a hub for renewable research."

As North Carolina's urban research university, UNC Charlotte is playing a key role in the transformation of Charlotte – primarily known for its banks – into a major energy hub. The latest evidence is the partnership between the two large energy firms and the University. EPIC will train a new generation of engineers and conduct research in new energy technologies. In doing so, the Center will serve the diverse needs of existing and emerging energy companies, further positioning Charlotte as an energy hub.

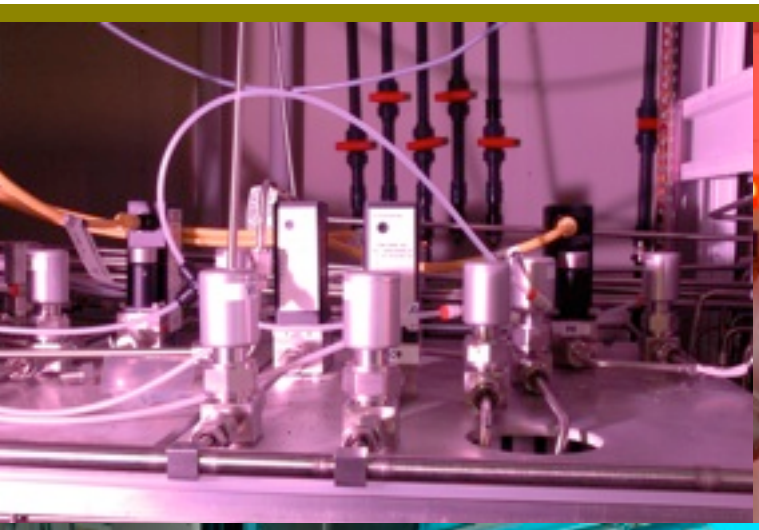
ELECTRICAL & COMPUTER ENGINEERING

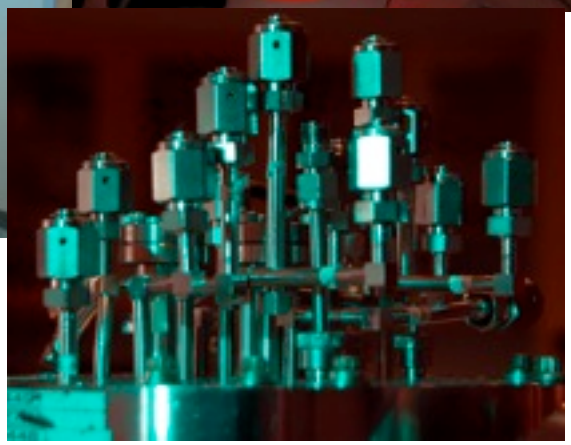


Among UNC Charlotte's many departments of innovative excellence, Electrical and Computer Engineering (ECE) encourages its students to embrace a cybernetic world. Headed by Professor and ECE Department Chairman, Dr. Ian Ferguson, this department has been growing at a pace indicative of the increasing interest in computer engineering.

The United States Department of Labor: Bureau of Labor Statistics calculates that Computer software engineers are among the occupations projected to grow the fastest and add the most new jobs over the 2008-18 decade, resulting in excellent job prospects. With such a prosperous outlook for graduates, the ECE Department at UNC Charlotte offers the following concentrations:

- power systems
- optoelectronics
- digital systems
- VLSI design
- data communications and networking
- automatic control systems
- electronics
- embedded systems
- microelectronics
- power electronics
- robotics
- nanotechnology
- biomedical engineering





ECE at UNC Charlotte is comprised of a variety of faculty and staff that bring about thought provoking, research studies that aid the ECE community as a whole. Primarily funded by the National Science Foundation (NSF), research areas covered by ECE include: Communications, Control and Signal Processing, Devices, Circuits and Systems, Energy and Sustainability, High Performance Embedded Computing, and Power Systems.

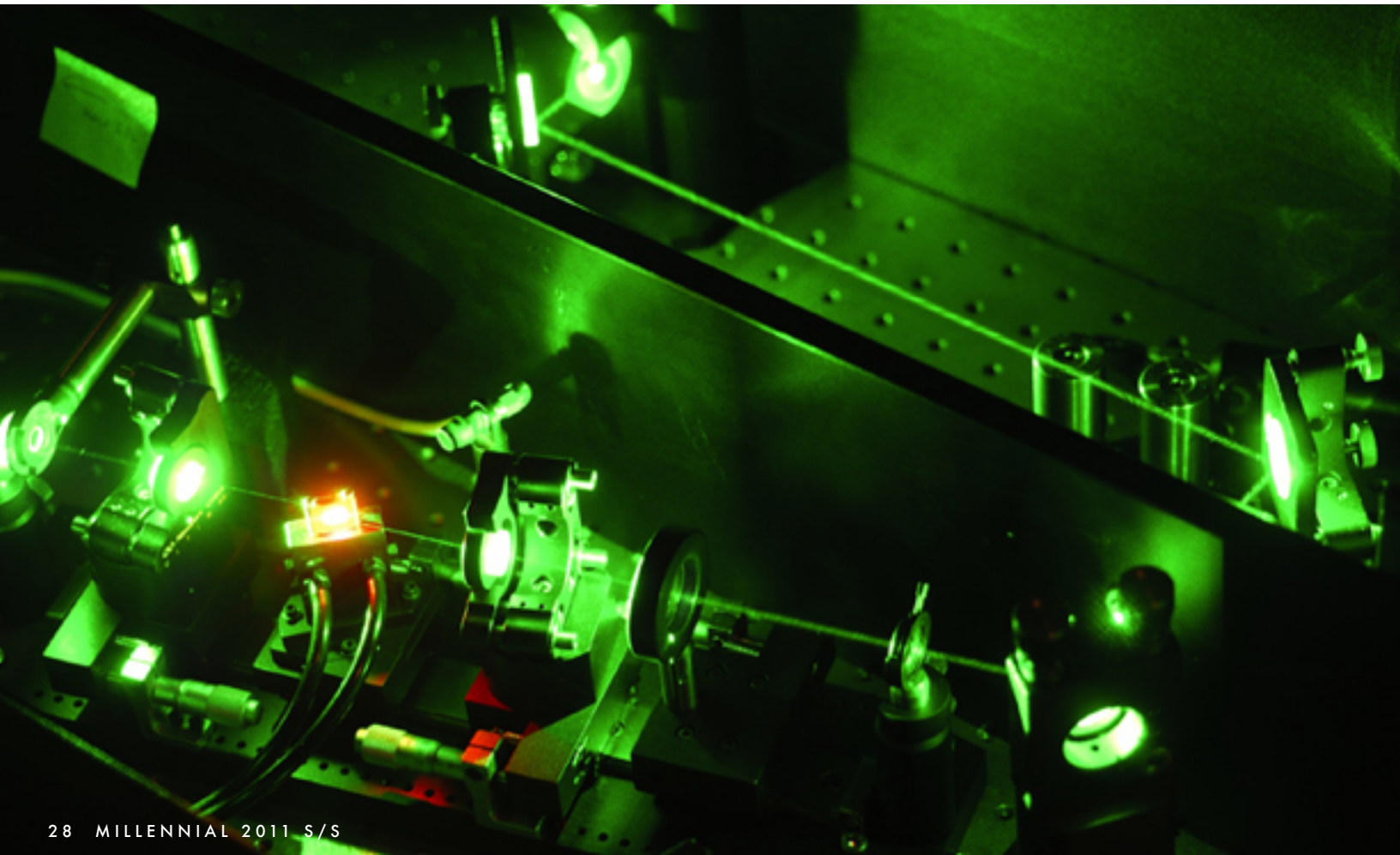
ECE students have an unparalleled opportunity to network, share ideas, and grow their overall professional knowledge by joining Eta Kappa Nu, the electrical and computer engineering honor society. With a mission of encouraging and recognizing excellence in the electrical and computer engineering field; Eta Kappa Nu memberships are made up of students, alumni, and other professionals who have demonstrated exceptional academic and professional accomplishments.

The ECE department will move into the new EPIC building when completed in mid-2012. This location offers an increase in space and improved facilities.

For more information visit: www.ece.uncc.edu

CENTER FOR OPTOELECTRONICS

The Center for Optoelectronics and Optical Communications brings about a unique opportunity to the UNC Charlotte Millennial Campus. Considered a sub-field of optics, photonics and optoelectronics research the interface between light and electronics for a variety of applications in commercial, energy, defense, and medical products. The Center is located in Grigg Hall, home of the Physics and Optical Science Department. Many of the Physics faculty perform optics-related research along with researchers from Chemistry, Mechanical and Electrical Engineering.



The center, headed by Center Interim Director and Chair of the Physics and Optical Science Department, Dr. Glenn Boreman, has a strong research focus on smart, integrated optical devices with a broad emphasis on photonics which includes:

- Optoelectronic devices and sub-assemblies
- Devices for telecommunications, sensors, and characterization
- Active and passive photonic devices
- Integrated optics and packaging
- Optical materials (semiconductors, polymer-organic and crystalline)
- Optical metrology
- Optical imaging
- Optical communication networks

These areas are critical to the acceleration of future enabling optoelectronics technologies, for example, manufacturing components for local optical networking. The center's integrated research approach, across multiple disciplines and industries, is grounded in materials, processing, fabrication, measurement and characterization.

The center has a Clean Room facility, Optoelectronic and Optical Device Fabrication facility, Optical Characterization and Measurement facility, Optical Communication Infrastructure facility, and an Optical Metrology facility located in Grigg Hall. These facilities are available for university lead research as well as for industrial partnerships.

In addition, the center's facilities are equipped with research instruments capable of performing Lithography, Materials Deposition and Etching, Packaging, Imaging and Characterization, Metrology, Networking and Fiber Optics, and Simulation and Modeling.

The Center for Optoelectronics and Optical Communications provides UNC Charlotte and regional industries with continued research possibilities and facilities equipped to achieve opto-success.

For more information visit: www.opticscenter.uncc.edu

LEAN LOGISTICS ENGINEERING SYSTEMS

Within the Williams States Lee College of Engineering at UNC Charlotte there is a center that focuses on everything from supply chain management for the textile/apparel industry, to risk management in complex system operations for business. The Center for Lean Logistics and Engineering Systems (CLLES) highlights solution driven projects that emphasize the best practices in Logistics, Supply Chain Management, Lean Manufacturing and Six-Sigma Quality Management.

The center, which also offers fast track Professional Certificate Programs geared towards industry, is headed by CLLES Director Dr. Gary Teng who won the 2009 Merl Baker Award from the Engineering Management Division of the American Society for Engineering Education. Contributing to the development and maintenance of CLLES research programs, Associate Professor Dr. Yesim Sireli focuses her research on systems analysis, policy development, strategic planning, global product innovation, customer-oriented product development, business forecasting, and quality management.

The Electric Power Research Institute (EPRI) is an independent, non-profit company performing research, development and demonstration in the electricity sector for the benefit of the public. In a project sponsored by EPRI, the Principal Investigator Dr. Sireli, spearheaded a project entitled "A Preliminary Study on Decision Support for the Nuclear Power Industry." The findings of the study indicated that although a significant portion of the workforce was retiring there was not enough focus on mitigating the issue of the workforce attrition. This "study involved a comprehensive survey of high level executives in the nuclear industry," says Dr. Sireli, "and the results suggested that, even though the participants described workforce attrition as a significant issue, the majority did not label it as a challenging issue that required immediate action." In an effort to increase the interest and growth of the nuclear field, the study recommended that the industry should reach out to schools and universities, and invest in education to generate, train and attract new workers. The study also sheds light on other matters in need of attention in the energy field, such as technological obsolescence and plant reliability issues particularly in aging plants. The establishment of the Energy Production & Infrastructure Center (EPIC) at UNC Charlotte, along with the industry's general interest in certain topics in engineering, indicates that the energy industry partnered with academia will rigorously work on mitigating these issues. Dr. Sireli's current energy research interests focus on improving the overall U.S. energy system that is expected to include both conventional and innovative power generation in an increasingly deregulated market.

With research interests such as supply chain and logistics management, lean systems process design, decision analysis and risk management, production systems modeling and design, and environmental systems modeling, Associate Director of CLLES Dr. Ertunga Ozelkan works to bring CLLES to the research forefront. Dr. Ozelkan, in association with Dr. Agnes Galambosi, introduced the "Lampshade Game," a new simulation program that focuses on educating students and industry professionals on lean manufacturing principles. Although a game might not be the first thing that comes to mind when talking about lean manufacturing principles, the game is an active learning tool that is capable of demonstrating the advantages and disadvantages of some of the key principles of lean manufacturing in comparison to mass manufacturing by manually simulating the production of lampshades for each of the process types. The game enables the comparison of three manufacturing methods by using different operational and financial metrics such as inventory levels, manufacturing cycle time, customer fill rate, production yield and cost and profit. By introducing methods for students and industry professionals to better understand the processes that lean manufacturing principles entail, Dr. Ozelkan and Dr. Galambosi have begun to lay down the groundwork for a better understanding of this field.

In keeping with the CLLES mission "To be the premier logistics and engineered systems design, analysis and implementation portal for supply chain, logistics, and engineering professionals from industry, government agencies, and academia," Dr. Teng mentions that in conjunction with the Infrastructure, Design, Environment and Sustainability (IDEAS) Center, CLLES is helping by "proposing a process on how to make Charlotte greener."

Assistant Professor of the Systems Engineering and Engineering Management Program Dr. Churlzu Lim whose research interests include non differentialization optimization, network interdiction, product variety, and the detection of structural changes in time series, also lends his expertise to CLLES.

With the many facets of research that affects peoples lives on a daily basis, CLLES has and continues to establish a bridge between UNC Charlotte and industry to integrate industry's needs into faculty research activities.

For more information visit:
www.seem.uncc.edu/clles/

CHEMISTRY

We are surrounded by and composed of minuscule elements that previously were part of an entirely different mass. This ethereal chemistry of sorts ignites the passion, innovation, and drive of discovery.

The Chemistry Department at UNC Charlotte is committed to providing its pupils with an infusion of state of the art resources with talented faculty members. Headed by Professor and Chair, Dr. Bernadette T. Donovan-Merkert, the Chemistry Department offers undergraduate and graduate degrees in a variety of chemistry subjects.

Both certified by the American Chemical Society (ACS), the B.S. in Chemistry and Chemistry with a Biochemistry option heavily focuses its coursework on future graduate level research. Students who pursue any of the Department's four B.S. degrees are well-prepared for future graduate studies, in part because undergraduate research is incorporated into the curricula of these degrees. Also offered:

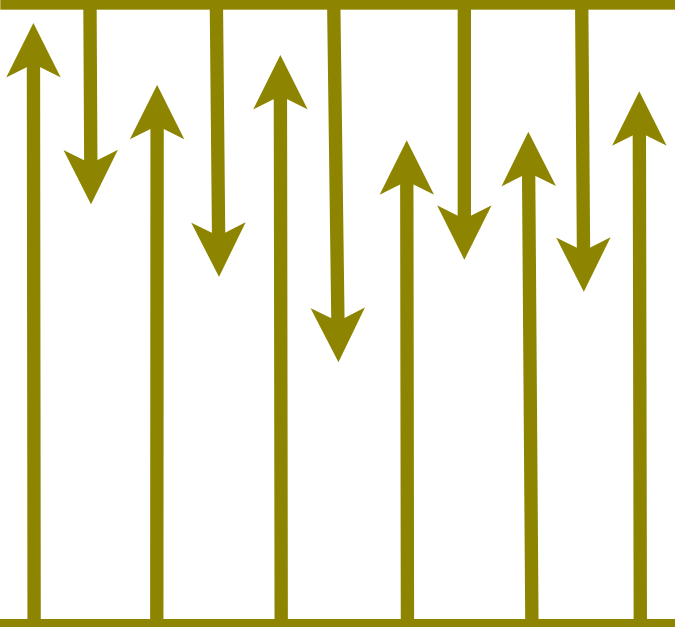
- B.A. degree in Chemistry with Secondary Teaching Licensure
- Minor in Chemistry
- Minor in Biotechnology (offered in collaboration with the Biology Department)
- Accelerated Early Entry to the Chemistry B.S. program

The Masters of Science in Chemistry program provides its pupils with a rich research experience that prepares them for careers in the chemical, pharmaceutical, textile, food, and power industries. Pupils have the opportunity to gain valuable research training with faculty members in a variety of formal and informal interdisciplinary programs. For those wanting to further pursue their research field, the Chemistry Department also offers a Ph.D. program in Nanoscale Science.

At the Chemistry Department, research drives innovation with a variety of topic areas covered. Faculty research interests include nanoscale science, computational chemistry, organic synthesis, polymer chemistry, organometallic chemistry, electrochemistry, structural and mechanistic organic chemistry, materials and interfacial chemistry, catalysis, biochemistry, bioanalytical chemistry, and biophysical chemistry. In working collaboratively, chemistry faculty work with professionals in the Biology, Bioinformatics and Genomics, Physics and Optical Science, Mechanical Engineering, Electrical Engineering, Civil Engineering, and researchers at the Carolinas Medical Center.

For more information visit: www.chemistry.uncc.edu

nanoscale



NANOSCALE SCIENCE a field of scientific investigation that is the development, manipulation, and use of materials and devices on the scale of roughly 1-100 nanometers in length, and the study of phenomena that occur on this size scale. The highest priority funded science and technology effort since the space race. Nanoscale science offers great potential for applications in materials, medicine, optics, electronics, data storage, advanced manufacturing, environment, energy, and national security.

The Ph.D. in Nanoscale Science at UNC Charlotte is an interdisciplinary program that prepares students to become scholarly, practicing scientists who possess the critical thinking, methodological, and communication skills required to advance and disseminate knowledge of fundamental and applied nanoscale science. The many challenges and opportunities that nanoscale science presents to society require collaborative, interdisciplinary approaches to research. Students enrolled in UNC Charlotte's Ph.D. program in Nanoscale Science learn about this exciting field from the perspectives of faculty members of a variety of disciplines and develop an advanced knowledge base of a selected science or engineering discipline. All of the NANO courses are team taught and/or co-developed by teams of faculty members from multiple disciplines. This approach provides students trained in a specific science or engineering field at the undergraduate or master's level with the tools needed to work effectively with scientists and engineers from other disciplines on cutting-edge research projects. Students in the program acquire the knowledge and skills needed to compete effectively for positions in academic, industrial, or government lab settings by completing interdisciplinary nanoscale science courses and elective courses, participating in program colloquia and seminars, working as a member of a team on projects and research proposals, and making research contributions independently and as part of a team.

DIVERSITY IN INFORMATION Technology Institute

Rachmaninoff, Tchaikovsky, and Beethoven inspire musical grandeur to aspiring musicians around the world yet, to Dr. Theresa Dahlberg these musical inspirations served as a stepping stone to a career driven by a thirst for engineering innovation.

Rachmaninoff, Tchaikovsky, and Beethoven inspire musical grandeur to aspiring musicians around the world yet, to Dr. Teresa Dahlberg these musical inspirations served as a stepping stone to a career driven by a thirst for engineering innovation. Originally a music major that loved math, "engineering came easier to me," says Dr. Dahlberg. Currently a professor of Computer Science at UNC Charlotte, Director of the Diversity in Information Technology Institute (DITI), and Director of the Students & Technology in Academia, Research & Service (STARS) Alliance, Dr. Dahlberg leads innovative programs that promote diversity in the computer science field.

The DITI mission is to advance innovation and discovery by broadening participation in computing. The institute's pipeline programs seek to increase students' preparation, interest and participation in computing from kindergarten through graduate school. The programs are national exemplars for bringing diverse students into computing, as well as for broadening the skill set of computing graduates, who increasingly need interdisciplinary knowledge and soft skills in addition to technical savvy.

Key to the success of DITI programs is the oversight provided by Associate Director Karen Bean and the active participation of more than a dozen faculty in the College of Computing and Informatics who serve as mentors and research advisors. DITI programs are undertaken as research projects to demonstrate effective practices for broadening participation.

The DITI interdisciplinary research team includes Dr. Tiffany Barnes, Computer Science Associate Professor, Dr. Kim Buch, Psychology Associate Professor, Dr. Audrey Rorrer, DITI Social Research Scientist, and Dr. Heather Lipford, Software and Information Systems Associate Professor.

"The STARS Alliance is our highest impact initiative," says Dr. Dahlberg. STARS is a consortium of colleges and universities with goals to enhance student recruitment, retention and success by involving students with their peers, the community and the computing discipline. All STARS schools implement the STARS Leadership Corps, a multi-year learning community that involves the tiered participation of students, professionals and educators in service-learning, civic engagement, and research. "The STARS Leadership Corps is a national 'call to action' to college students to recruit, develop, and become the next generation of computing professionals," says Dr. Dahlberg. "Students are challenged to undertake team-based leadership projects that advance their own capabilities while also reaching out and pulling up a younger student."

According to the STARS Alliance 2006-2010 Annual Report, 762 students have participated in the STARS Leadership Corps, within 23 colleges and universities, and represent U.S. citizens from all demographic groups, but primarily women and African Americans. These students have participated in research experiences and internships, served as peer mentors and tutors, and conducted outreach to over 28,000 K-12 students to convey the excitement, global reach and social relevance of computing in the 21st century. Seven service-learning courses and five student organizations have been created to institutionalize the Corps. Although enrollments in computing have been declining nationally since 2000, enrollments in the STARS schools have mitigated this decline. STARS doctoral granting schools that implemented the Corps for three years increased their enrollment in computing graduate programs by 32% from 2006-2009, while graduate enrollments nationally increased by only 2% during this timeframe. With $9 million in awards from the National Science Foundation from 2006-2016, the DITI is growing the STARS Alliance to over 50 colleges and universities

In continuing on their quest to nourish the computer science field with an array of multicultural talent, DITI serves as a source of inspiration for other professional fields with diversity deficits.

For more information visit: www.cci.uncc.edu/diti

VISUALIZATION CENTER

Imagine a world where bountiful flora and fauna join together to bring about an aesthetically pleasing view. Although this might sound a bit far fetched for those living amidst a concrete jungle (buildings) its a virtual possibility at the UNC Charlotte, Visualization Center (VisCenter).

Primarily funded by the National Science Foundation (NSF), the VisCenter at UNC Charlotte promotes the science of virtual analytics and advanced interactive visualization as an integrative discipline that is indispensable for attacking key real world applications. Spearheaded by Bank of America Endowed Chair in Information Technology, and founding Director of the VisCenter, Dr. William Ribarsky, this center has been a driving force in placing Charlotte in the forefront of the visualization field.

For many VisCenter projects, Ribarsky states, "visual analytics combines visualization and analytics." Visual analytics can analyze and solve problems relating to, for example, coastal natural disasters. It combines models of storm surges, hurricane force winds, extreme flooding and other phenomena to create different models to look at possible outcomes, and in turn helps emergency responders make decisions. It can also procure social models which tell how the common person might respond to such cataclysms.

The VisCenter is a key partner in the Renaissance Computing Initiative (RENCI). This is a partnership among five NC universities: UNC Chapel Hill, NC State, UNC Charlotte, Duke, and UNC Asheville. RENCI uses technologies to model and manage urban sprawl and mitigate its effects, to improve medical diagnostics, and to assist biomedical researchers. The RENCI engagement site at UNC Charlotte is dedicated to sustainable metropolitan growth and assessing and projecting how communities grow and change over time. In order to gain a clear assessment of metropolitan growth, RENCI at UNC Charlotte combines various kinds of data with applied Geographic Information Systems (GIS) technology and visualization tools to create data-rich, graphic representations of how growth is changing the landscape of North Carolina and the potential policy implications of that growth. RENCI has been awarded $300,000 from the

NSF to study how land owners' decision processes affect forest persistence. The grant was one of 17 awards made to pilot urban research projects and covers a 30-month period which began on September 15, 2010, with the possibility of much greater funding as the pilot develops.

Visualization conferences revolve around the next best technology or concept pertaining to interactive visualization and visual analytics. These conferences set the trend for years to come by pushing the boundary of what is possible into the realm of actuality. Conferences in which the VisCenter has recently or will participate include:

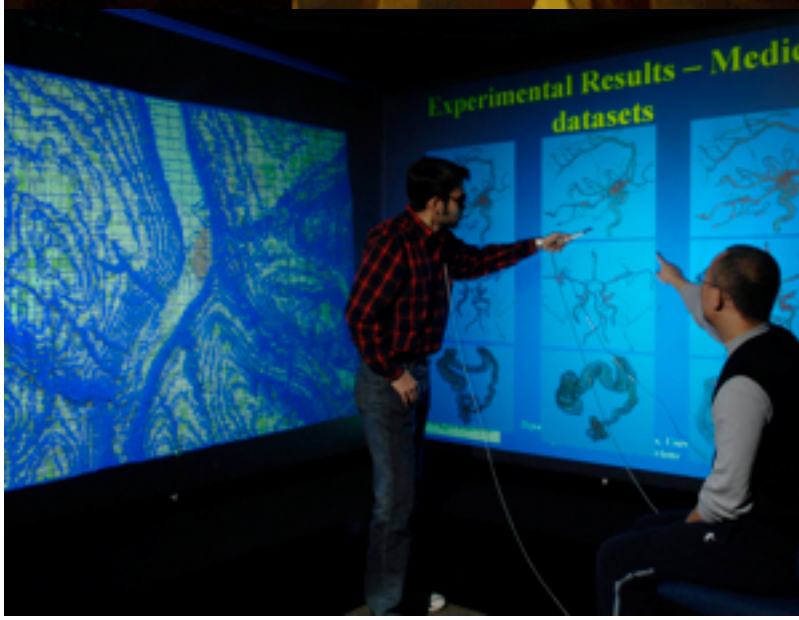
- **IEEE Virtual Reality Conference 2011 March 19-23, Singapore.** The conference focuses recent research and development in the fields of virtual environments, augmented reality, 3D user interface, etc. Researchers and practitioners actively working in VR area will get together to discuss the recent research/technology developments and trends.

- **VisWeek 2011 October 23-28, Providence, RI.** This is the premier forum for visualization advances for academia, government, and industry, bringing together researchers and practitioners with a shared interest in tools, techniques, technology and theory. The week is organized around three separate conferences:

  - **IEEE Visualization 2011**.
    This conference was the original venue for all visualization research, and it remains centered around the exploration and formalization of visualization methodologies for data that has an intrinsic spatial component. 2011 will mark the 22nd anniversary of the conference.

  - **IEEE Information Visualization 2011.**
    Already in its 17th year, this conference responds to the need for a specific area of research to investigate cognitively useful visual mappings for datasets that are not inherently 'spatial' and accompanying the mapping by interaction techniques that allow people to intuitively explore them.

  - **IEEE Visual Analytics Science and Technology 2011.**
    Building on the solid foundations established in Visualization and Information Visualization conferences, VAST, is motivated by the need for a deeper understanding of the reasoning processes involved in visual analysis; the need to combine information from multiple sources (spatial and non-spatial, real and theoretical) in visual environments, and the application of visual environments to generate useful insight about complex, real-world problems. This will be the 6th IEEE VAST conference.



As a leader in a field that prides itself in taking many steps forward, the VisCenter has and will continue to place Charlotte and the surrounding region on the Visualization and Visual Analytics map for decades to come.

For more information visit: www.viscenter.uncc.edu

cybersecurity

Security reassurance through configuration verification research has determined that 65% of the vulnerability on the Internet is due to human (e.g. operator) errors and incorrect configuration of network systems. The goal of the research is to automate discovery of these errors and correct them in real time behind the scenes

without human intervention, thus creating a more secure and trusted environment.

As Director of the CyberDNA Center, Dr. Al-Shaer, his colleagues, and students are conducting research to help mitigate these threats now and well into the future. The CyberDNA Center is also developing the next generation cyber defense system or what Dr. Al-Shaer calls, "Moving Target Defense". He says the configuration would be in constant motion, thus forcing the cyber terrorists to be continually seeking out their target while allowing the end user to be able to access their information.

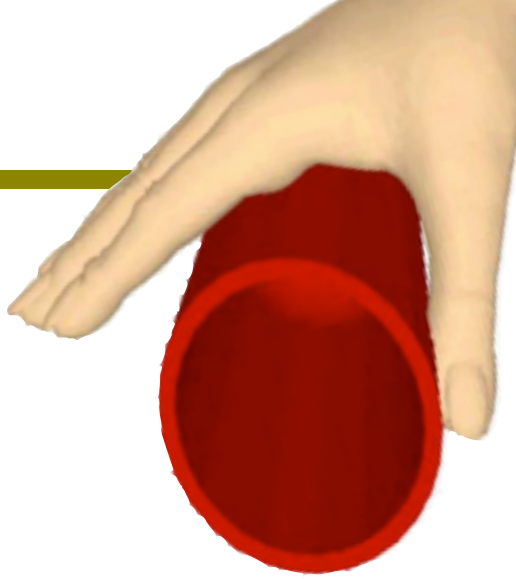
The Department of Software and Information Systems is graduating highly focused and technically skilled students equipped to deal with modern day threats to cyber space. To be able to prevent cyber attacks, the "new" cyber warriors must have the highest level of computer skills and ongoing education in emerging technologies and applications.

"The new challenge in the 21st Century is keeping up with the bad guys," said Dr. Wu, Associate Professor in the Department of Software and Information Systems and Director of the Data Privacy Research Lab. "In our research, we need to focus on how an attacker will deal with different types of data. You have to be able to think like the bad guy in order to protect against them. We have to know how they thin and how they will attack us, so we know how to fight back," states Dr. Wu.

As we evolve in this technology driven age, financial services, healthcare, energy, infrastructure, and social networking will all be interconnected in ways that we have never imagined. Smart technology will allow individuals to conduct their daily tasks and access information from virtually anywhere at anytime from the palm of their hand, making data privacy and the research being conducted by Dr. Wu and his team even that much more imperative today.

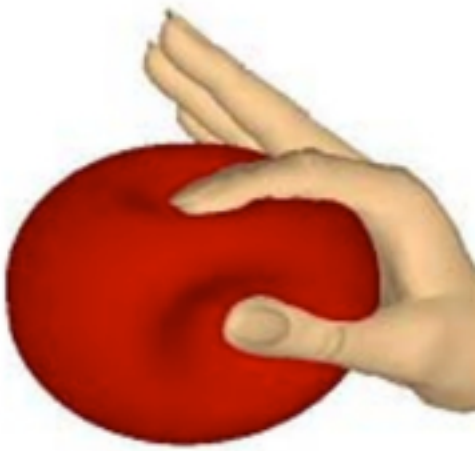
For more information visit: www.arc.uncc.edu

robotics



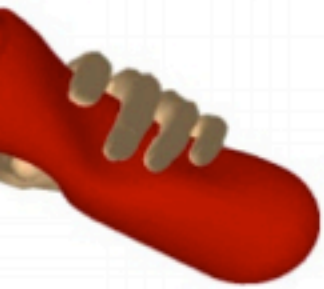
Welcome to the future or at least that's how it seems. At UNC Charlotte and around the world robots are coming to life in varied shapes and sizes to help humans with day to day tasks. Twenty years ago current Professor of Computer Science and Associate Dean for Research at UNC Charlotte College of Computing and Informatics, Dr. Jing Xiao, began to develop a robotics initiative that has paved the way for the university to be in the forefront of this futuristic field.

Dr. Xiao and her colleague, UNC Charlotte Associate Professor Dr. Srinivas Akella, focus mainly on Robotic Manipulation, Motion Planning, and Haptic Simulation and Rendering. Specific research topics include: real-time adaptive robot motion planning for mobile manipulators in unknown dynamic environments and for pursuit and evasion, motion planning for continuum manipulation, compliant motion planning, complementarity-based kinodynamic motion planning involving contacts, motion coordination of multiple robots, haptic rendering of complex contacts between rigid objects and between a rigid and an elastic object, and proximity queries for dynamic and haptic simulation.



In a project currently funded by the National Science Foundation, Dr. Xiao in collaboration with Clemson University Professor Dr. Ian Walker, are studying autonomous manipulation of objects with a robot resembling an elephant trunk or an octpus arm, which is called an OctArm manipulator. Such a continuum manipulator is especially apt to function in unstructured and congested environments with its ability to "snake" in and through very tight obstacle fields, for example, in surgical applications and in search and rescue operations in collapsed buildings.

In a current project funded by General Motors, Dr. Xiao is investigating novel assembly operations by robot manipulators. The robotic assisted assembly operations provide solutions to shift largely the "heavy lifting" burden from human workers to machines to prevent injury and provide safety to human workers.



In its long term effect, robotic technologies are increasingly making their way into every facet of people's everyday lives,first in factories, such as welding and painting robots, now hospitals, such as robotic surgery devices, and eventually households, starting from automatic vacuum cleaners.

complex systems

The **Complex Systems Institute (CSI)** is a multi-disciplinary research center that provides a home for researchers who cross disciplinary boundaries in search of holistic answers. Current faculty come from areas as diverse as: Computing, Political Science, Sociology, Business, Biology, Communications, Philosophy, Theatre, Language, and Health and Human Services.

CSI brings together academia, industry, and federal agencies to advance computing simulation, analysis, and modeling. Tools developed by CSI members help analysts model infrastructure and social networks, visualize and understand how individual networks behave, and understand multiple-network interdependency behavior, including second-and third-order effects and unintended consequences.

There are three centers within the Institute. **The Complexity Laboratory** focuses on dynamic non-linear systems and the development of tools and techniques for studying complexity in natural, physical, and social domains. **The Defense Computing Center** is responsible for defense and intelligence-related research, emphasizing system-of-systems modeling and simulation for analysis of complex problems and phenomena. **The Center for Advanced Research in the Humanities** explores the interdisciplinary nature of complex systems, as well as the methods and language used to describe and understand these systems.

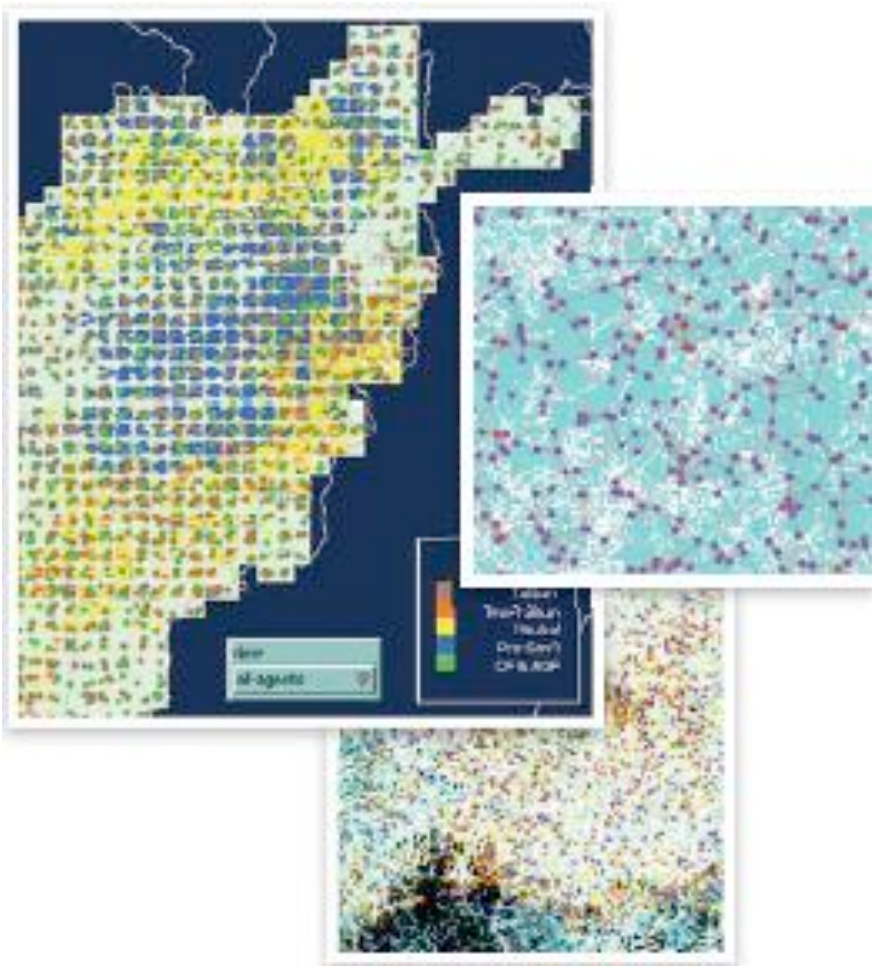
Currently CSI is working on a NIH funded program for **Computer Simulations in the Humanities**. This project will add a variety of simulation techniques to the standard repertoire of methods already employed by humanists. Interested humanists from a range of disciplines including philosophy, history, archeology, linguistics, anthropology and political science will work not only with technical experts but also with humanists already familiar with methods involving computer simulations and models. Our aim in bringing technologists and humanists together in precisely this way is to promote the dual notion of "the humanities shaping technology" as well as "technology shaping the humanities." Modeling experts will be pressed to not merely present existing techniques, but to shape those techniques in ways that address questions and on-going inquiries pursued by humanists. To make this institute be of genuine value to both humanists and modeling experts, time will be divided between hands-on training with existing modeling techniques, design sessions discussing how these models can be improved to address humanist questions/projects, and general presentations on how to enhance the interaction between technology and the humanities.

The Institute brought together 24 humanists from a variety of disciplines to gather daily over three weeks at the beginning of June, 2011 to learn from talks and discussion each morning, work on models in the afternoon, and attend evening lectures. The topics ranged over various aspects of the humanities-technology interaction and the nature of collaborative, interdisciplinary research within the humanities. This project will include a 3-day follow-up session in 2012.

complex systems

Other projects going on at the Complex Systems Institute include:

- **Marine Ecosystem:** This project brings together computer scientists, biologists, environmental researchers, mathematicians, economists, and industry experts in order to: 1) create computer simulations of multiple tropic levels in a general marine ecosystem model; 2) better understand the complex dynamics of the Lotka-Volterra equations in a more realistic setting; 3) validate the results of these computer models; and 4) use these results to suggest more robust economic models of sustainable industrial practices.



- **Nanoperception:** The Public Perception of Nanotechnology. This project encompasses an analysis of the public perception of nanotechnology as a complex system—a system thus labeled Nanoperception. The interdisciplinary research required of complexity science and of this project, in particular, is a recognition of the fact that, in order to grasp nanoperception, one must reach beyond separate agents or influences to gain a true appreciation of the overall behavioral pattern of the system.

- **Hospital Environment Simulation:** Complex Adaptive Systems techniques are used to design an agent-based model for simulating systems, allowing for exploration of large datasets related to patient outcomes, thus allowing the operator to tailor an experimental design that more precisely fits the environment being studied while benefiting from the vast amount of data available across many different environments.

- **Creative IT:** The Institute is developing, testing, and deploying a general complex adaptive systems (CAS) model as a new technology for supporting creativity.

- **Hyperlocal Community Platform:** The geographic community remains the center of our public life, and the quality of our local environment greatly impacts the quality of our lives. The goal of this project is to: 1) build a web platform to serve as local hubs for the community, encouraging the emergence of self-organized groups that are defined by geography as much as topical interest; and 2) use complex adaptive systems to model and study emergent clusters so that these local communities are transparent and understandable to the users, allowing for positive feedback and influence towards even greater local engagement.

For more information regarding Complex Systems visit: http://complexity.uncc.edu

BIOINFORMATICS RESEARCH CENTER

Building a program from the ground up is no small feat. In the startup process mundane rules and regulations need to keep up the pace with flourishing ideas and hopes of a successful academic program. The Department of Bioinformatics and Genomics (BIG) has broken ground in more than one way based on the newest structural addition at UNC Charlotte's Charlotte Research Institute (CRI) MILLENNIAL campus. The department has ignited an interest in rapid and complex analysis of biomedical data that is new to the Charlotte region.

Led by Director of BIG, Dr. Lawrence Mays, the department has been making strides towards establishing a well-rounded Bioinformatics academic program. The Ph.D. program in Bioinformatics and Computational Biology is "a pretty important milestone for BIG" says Dr. Mays. The interdisciplinary program intertwines the disciplines of Biology, Chemistry, Mathematics, Statistics, and Computer Science. Apart from the basic eligibility requirements (undergraduate major in either a life science or a quantitative discipline) the curriculum encompasses bioinformatics and computational biology applications that give pupils a deep understanding of skills and knowledge that will help them succeed in a competitive job market. The program is designed to prepare students for employment in academia and in the biotechnology sector where the need for knowledgeable life scientists with quantitative and computational skills has exploded in the past decade.

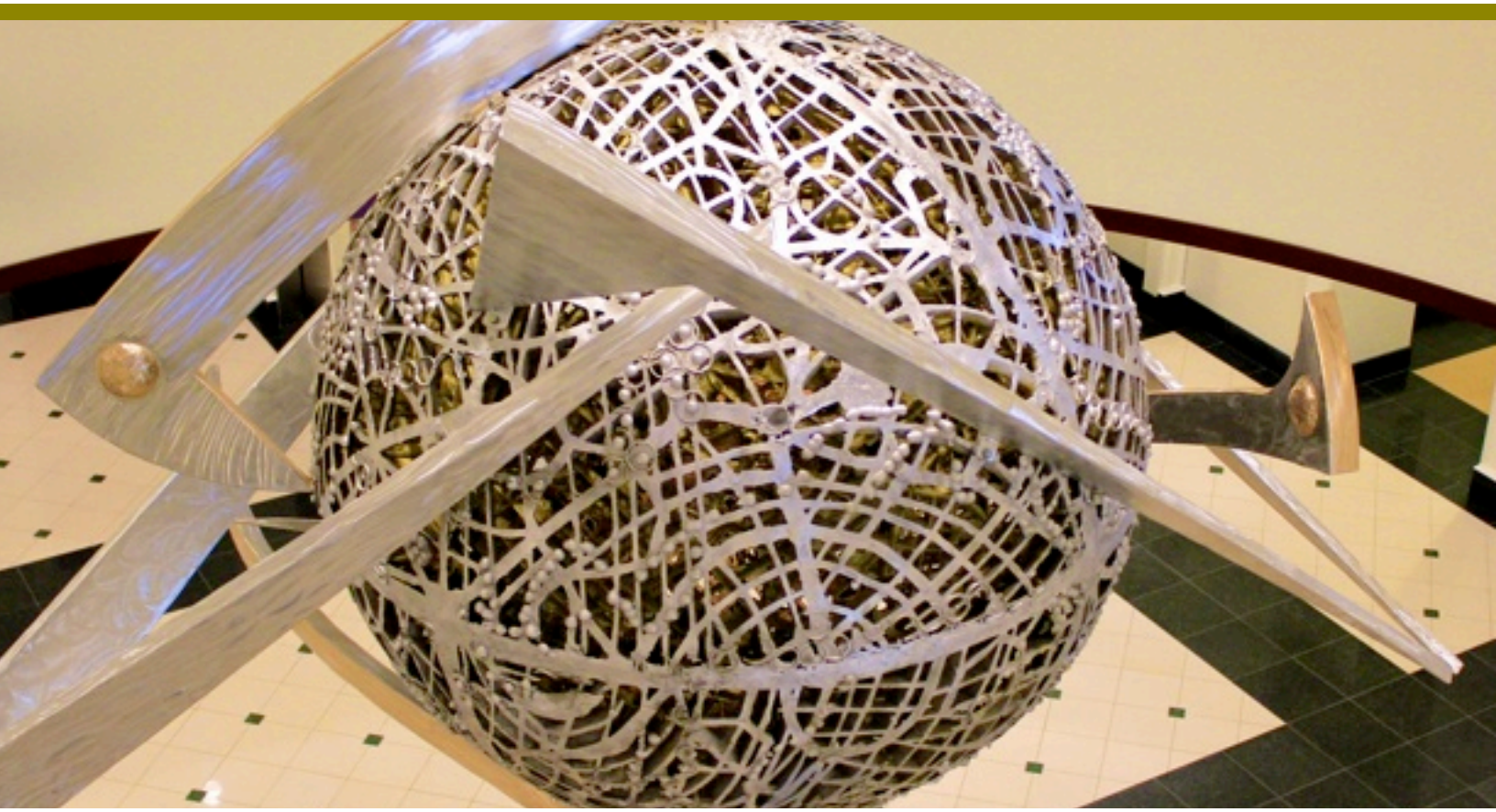
With a branch office at the North Carolina Research Campus (NCRC) in Kannapolis, BIG provides its students with hands on experience by offering professional research project mentoring. Research is what matters, and ultimately what paves the way forward for ideas and inspirations is to have a solid foothold in the Bioinformatics and Genomics field.

Currently, BIG is involved in:

- **High Throughput Studies**
  - This can be considered from two perspectives: there are platforms that measure many datapoints per sample; there are also platforms that measure the response of many samples to one treatment.

- **Computational Biophysics**
  - This is an area focused on the development of predictive models and simulation techniques based on first principles; it attempts to develop theoretical models that capture the essential physics, chemistry, and biology of a system.

- **Structural Bioinformatics**
  - This subset of bioinformatics effort is related to the archival/retrieval, comparison, and prediction of biological structures.



- **Metagenomics**
  This new field of genetic research enables studies of microorganisms that are critical for our health and the environment, but are not easily cultured in a laboratory.

- **Genome Wide Association Analysis**
  The goal of this research is to identify genetic variants associated with human disease, especially for conditions to which multiple genes contribute.

- **Systems Biology**
  This is the study of complex interactions in biological systems in a quantitative manner.

- **Computational Mass Spectrometry**
  This has to do with processing, analyzing, and visualizing mass spectrometer data with the ultimate goal of extracting biological meaning from them.

BIG operates the Bioinformatics Research Center at UNC Charlotte and also a Bioinformatics Services Group at the North Carolina Research Center in Kannapolis.

For more information visit: www.bioinformatics.uncc.edu

BIOINFORMATICS at NCRC

A short drive north of Charlotte, on the site of what was a large textile mill, lies over a million square feet of state-of-the-art lab and office space that make up what is now the North Carolina Research Campus (NCRC). This private-public venture, initiated by David H. Murdock, combines university, government, and industry research with the goal of fostering collaboration and advancements in human health and nutrition. This site is also the home of a branch of the UNC Charlotte Bioinformatics Department known as the Bioinformatics Services Division (BiSD).

Led by Dr. Cory Brouwer, the BiSD was developed to help carry out the mission of the UNCC Bioinformatic Research Center by providing bioinformatics services to the NCRC campus (as well as UNCC and the Charlotte area), advancing research in the field of bioinformatics and assisting in the training of the next generation of bioinformaticians. To accomplish this mission, BiSD has focused extensively on adding highly skilled personnel to the department. In just over a year the BiSD team has grown from three employees to the present group of nine research associates, staff and interns. Brouwer plans on filling additional positions over the next year. Currently the team includes Dr. Wei Sha, Dr. Raad Gharaibeh, Dr. Rob Reid, Dr. Weijun Luo, Steven Blanchard, Kim Davis, Dr. Ling Guo, and Benika Hall.

Dr. Wei Sha was the first Research Associate on the team and has developed an active and growing list of publications through collaborations on the NCRC campus. One recent publication Dr. Sha participated in with Dr. David Neiman of Appalachian State was even highlighted by several major news outlets such as the British Broadcasting Corporation (BBC) and Time Magazine.

Three members of the current team (Gharaibeh, Reid, and Hall) are recent UNC Charlotte Bioinformatics graduates. “The quality of the program here at UNC Charlotte has been excellent preparation and I’ve been fortunate to be able to hire some of our talented graduates,” says Dr. Brouwer. The latest addition to the team is Dr. Weijun Luo who is a Research Assistant Professor in the Bioinformatics Department. Dr. Luo joins the team from Cold Spring Harbor.

Pictured above are Dr. Robert Reid, Steven Blanchard, Dr. Wei Sha, Dr. Raad Gharaibeh, and Dr. Cory Brouwer in the atrium of the Core Lab Building where the team is located on the third floor. “We’re here to help,” explains Dr. Brouwer who encourages those with bioinformatics questions to contact them.

For more information visit: www.bioinformatics.uncc.edu

KINESIOLOGY

In its virtuous nature the human body often has the capability to heal itself, and in a best case scenario repair the area in question without a trace of previous disturbance. The Department of Kinesiology at UNC Charlotte is making research advancements that span areas in biodynamics, cardiovascular and exercise genetics, and muscle physiology that contribute to the foundation in promoting optimal health and well-being by encouraging life-long movement and activity in a variety of populations through teaching, scholarly research, service and community engagement.

The department's philosophy with its academic programs is to intertwine the classroom environment with real life experiential learning so students can put to practice what they learn across all subject areas.

Athletic Training

Under the leadership of Program Coordinator Dr. Tricia Hubbard, the Bachelor of Science in Athletic Training has been preparing students to be certified athletic trainers since 2002 and in January 2009 received a 10-year reaccreditation from the Commission on Accreditation of Athletic Training Education (CAATE) which was the longest term given by CAATE.

Exercise Science

By receiving its initial 5 year accreditation from The Commission on Accreditation of Allied Health Education Programs (CAAHEP) in January 2009 the Bachelor of Science in Exercise Science program lead by Program Coordinator Mr. Roy Fielding offers a curriculum that prepares students to sit for the American College of Sports Medicine Health Fitness Specialist certification.

Respiratory Therapy

First established in the Fall of 2007, and currently led by Interim Program Coordinator, Dr. Joe Coyle, the Bachelor of Science in Respiratory Therapy emphasizes providing an advanced course of study for students who are currently practicing as licensed respiratory therapists. The program's focus is to specifically help enhance the student's professional standing in their Respiratory Therapy career with advanced classes in administration, research and evaluation, and critical care monitoring.

Clinical Exercise Physiology

Guided by Program Coordinator, Dr. Susan Tsivitse and with an initial 5 year accreditation form CAAHEP, the Master of Science in Clinical Exercise Physiology program is designed to prepare students to become Registered Clinical Exercise Physiologists. In addition to the department's Masters degree program, it also contributes to the interdisciplinary PhD programs in Biology, and Health Services Research.

Exploring specific topic areas deeply and learning about various facets and attributes is what motivates the research faculty in the department to pursue their scientific and clinical endeavors. Collectively, the department explores these areas through the use of two primary laboratories:

Exercise Physiology Research Laboratory

With approximately 2500 square ft of dedicated space that is fully available for basic and applied research, the Exercise Physiology Research Laboratory investigates:

- The genetic regulation of daily physical activity and exercise endurance
- The genetic influences of cardiac apoptosis and body mass across the lifespan
- The genetic susceptibility to hyperoxia induced changes in heart rate and heart rate variability
- The mechanisms of developmental cell signaling pathways on skeletal muscle regeneration and stem cell proliferation following injury

Biodynamics Research Laboratory

Focused on the study of neuromechanical consequences of lower extremity joint injury and pathology. This research laboratory supports neuromuscular and motion assessment research that investigates:

- Alterations in lower extremity joint kinematics and kinetics in patients with ankle & knee osteoarthritis during stair walking gait
- Mechanical joint laxity and sensorimotor adaptations in acute lateral ankle sprains and chronic ankle instability
- The efficacy of ACL reconstruction procedures and ACL deficiency on 3-D knee joint motion and quadriceps inhibition
- Mechanical joint laxity and sensorimotor adaptations in the osteoarthritic ankle joint

With the future in its horizon the Department of Kinesiology continues to deliver high quality education programs that encourage discovery from expanded research efforts and service to the community.

For more information visit: www.kinesiology.uncc.edu

NURSING

Having a knowledgeable nursing practitioner at your side will surely sooth your nerves when illness strikes. At UNC Charlotte, the Nursing program has been impactful in creating strong relationships within the Charlotte health care community and beyond.

Currently headed by the Director for the School of Nursing Dr. Dee Baldwin, UNC Charlotte (formerly known as Charlotte College until July 1, 1965) established its nursing program in 1964 at the request of letters of support written by members of the nursing community, and specifically nurses at the Heath Department. Viewing the regional need for a nursing program, Charlotte College President Bonnie Cone inaugurated the Nursing Department which enrolled its first seven students in the spring of 1965. Today, the School of Nursing oversees 200 graduate, and 333 undergraduate students who embody the future of a profession that embraces wellbeing at its core.

With a rigorous academic program accredited by the Commission in Collegiate Nursing Education through 2011, and approved by the North Carolina Board of Nursing, the School of Nursing offers degrees in:

- pre-licensure BSN program (undergraduate)
- RN-BSN program (undergraduate)
- Nurse Anesthesia program (Graduate)
- Family Nurse Practitioner program (Graduate)
- Community/Public Health Nursing program Graduate)
- Nursing Education program (Graduate)
- Nursing Administration program (Graduate)

In the near future the School of Nursing plans to include a Doctorate of Nursing Practice with a focus on Leadership in Direct Clinical Care and Systems/ Populations Practice. Currently, the School of Nursing participates in the Heath Services Research PhD program (Doctoral) in the College of Health and Human Services.

Having the necessary tools to succeed in any career path is pivotal to a pupil's success that's why the Learning Resource Center provides learning resources and laboratories for nursing and other health professionals. Offered resources include skills lab, heath assessment lab, simulation lab, observation and examination rooms.

The School of Nursing at UNC Charlotte strives to fully prepare its future practitioners by providing educational, research, and practical resources to achieve ultimate success.

Research activities focus on two areas: Vulnerable Populations and Symptom Management. Extensive research is also underway to provide assistance and rehabilitative technology for severely injured persons such as wounded warriors.

For more information visit: http://nursing.uncc.edu

BIOLOGY

At UNC Charlotte the Department of Biology provides its students, faculty and researchers with unparalleled learning opportunities to propel into success.

With a new Chair, Dr. Martin Klotz, joining the department from University of Louisville in July, the Biology Department prides itself in providing its graduates with the best quality of education and research experience. With rigorous academic programs the Biology Department offers two types of majors a B.A. and a B.S. as well as a minor in Biology or a minor in Biotechnology. Prospective Biologists have the chance to associate their major with an array of concentrations:

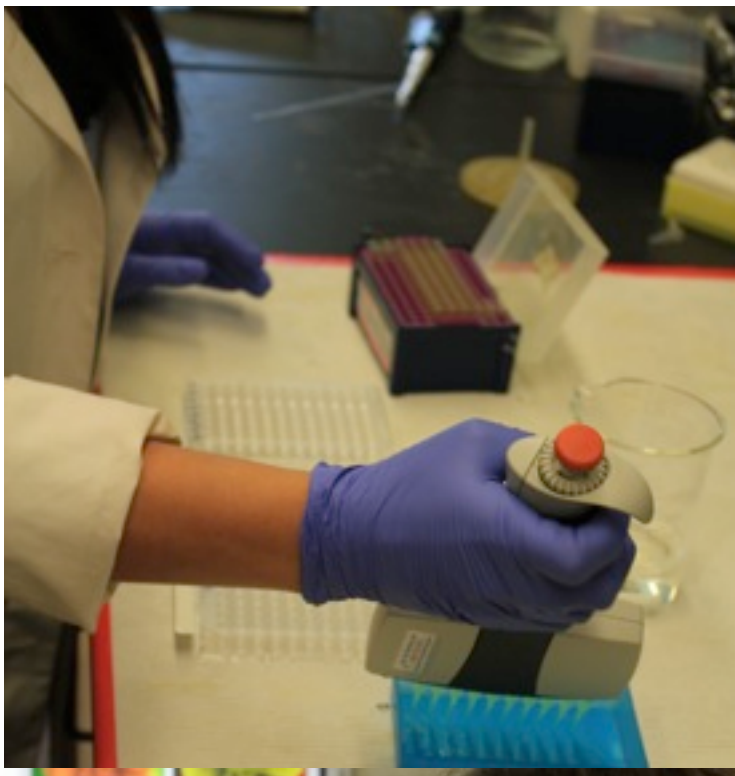
- ecology/environmental
- microbiology
- cell/physiology
- chiropractic (articulation agreement with Logan College of Chiropractic)
- medical technology (in collaboration with local clinical Medical Technology programs)

A Masters in Biology provides broad training in a variety of biological areas as well as specialization in areas of particular interest to the students. The program provides a wide array of research facilities, extensive library holdings, computing services and locations for research in laboratories and natural environments . In addition, both teaching and research assistantships are available to provide financial support for graduate students.

In its interdisciplinary approach, the Ph.D. in Biology program provides its students with the opportunity to work with various departments and is intended to serve students with interests in teaching and conducting research in academia, industry and clinical settings. The program draws upon the strengths of faculty in multiple departments to produce graduates who will be able to integrate the strengths of more than one discipline in solving biological problems.

Keeping in mind its pivotal role in the road to innovation, research in the Biology Department emulsifies itself with the spirit of discovery. Research areas covered include animal behavior, biochemistry, bioinformatics, biotechnology, cell biology, developmental biology, ecology and environmental biology, genetics, immunology, microbiology, molecular biology, physiology, toxicology and virology.

In procuring topnotch talent, the Biology department has provided and continues to provide UNC Charlotte and the surrounding community with stellar graduates and research that helps advance the ever evolving nature of biology.



For more information visit: www.biology.uncc.edu

Cancer RESEARCH

With its in-discriminatory prowess, no holds barred invasion, and ability to cause havoc without remorse, cancer swiftly turns a life upside down.

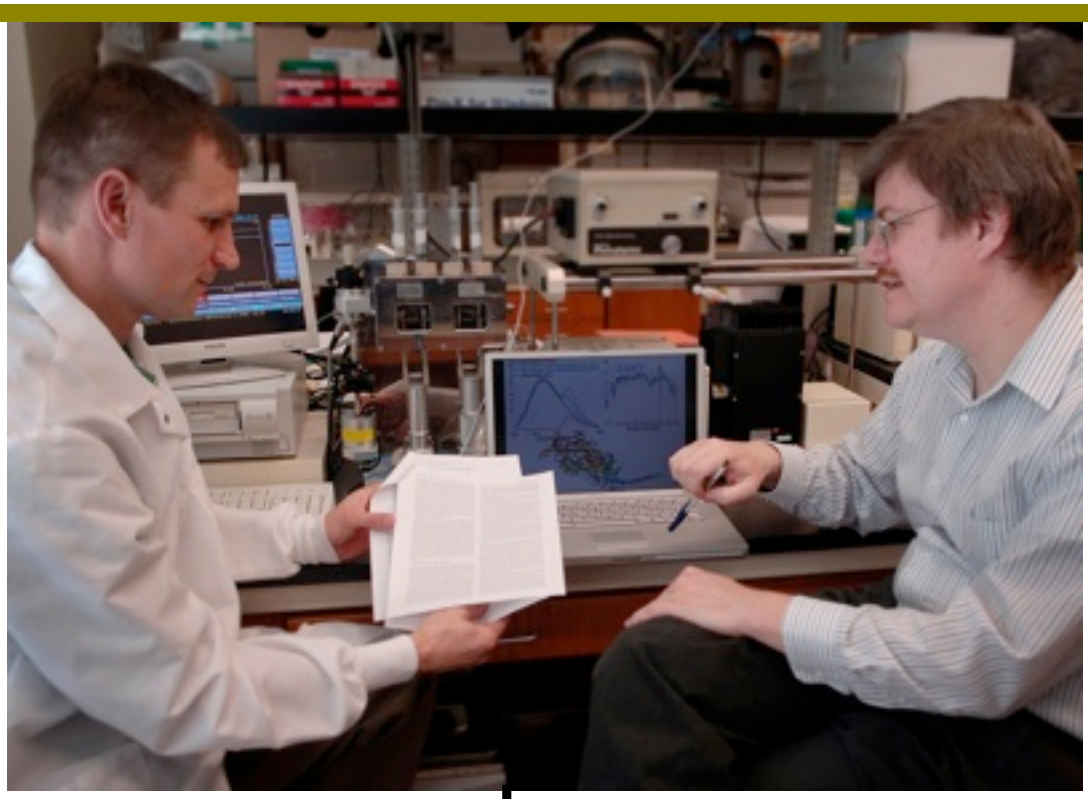
Originally from India, the Irwin Belk Endowed Scholar for Cancer Research and Professor of Biology at UNC Charlotte, Dr. Pinku Mukherjee began her quest for learning more about cancer when growing up her aunt died because of the deadly ailment. According to the **United Nations World Women's 2010: Trends and Statistics report**, it is estimated that, "breast cancer among women and lung cancer among men top the list of new cancer cases globally" and findings such as these propel researchers like Dr. Mukherjee to find innovative ways of treating and ultimately diminishing the impact of the deadly disease.

Primarily funded by the National Institute of Health, Dr. Mukherjee focuses her research on the role of inflammation and MUC1 (a tumor-associated protein over expressed in 90% of all solid cancers) in pancreatic and breast cancer progression and metastasis. Dr. Mukherjee oversees two post doctoral professionals, Dr. Jenny Curry, and Dr. Lopamudra Das Roy (see pages 14-15) who study novel strategies for targeting molecules within the tumor microenvironment. This includes understanding the immune-tolerant and chemo resistant tumor microenvironment including the role of cancer stem cells. The laboratory is also looking at the role of autoimmune inflammatory arthritis in recruitment and homing of tumor cells attaching to the bone to form bone metastasis during breast cancer development. In years to come, Dr. Mukherjee hopes to take her research findings to the next level by developing vaccinations in addition to innovative methods to treat this deadly ailment. Dr. Mukherjee has recently founded 'CanDiag LLC', a company dedicated to developing early diagnostic blood-based tests for a variety of cancers.

Dr. Mukherjee came to UNC Charlotte with a wealth of experience in cancer research holding faculty positions at The Mayo Clinic School of Medicine, Indiana University Medical Center, and Pennsylvania State University. She completed her Masters and Ph.D. in Applied Immunology from The University of London in the United Kingdom before relocating to the United States. She has published extensively in major scientific journals and has several press releases about her research in **Breast Cancer News, American Association for Cancer Research, and The Pancreatic Cancer Network**. Over the years, her research has been funded extramurally by the National Institutes of Health-National Cancer Institute, Department of Defense, American Association for Cancer Research, and The Susan G. Komen Breast Cancer Foundation.

UNC Charlotte researchers and clinical partners such as the Carolinas Medical Center (CMC) are accelerating their basic sciences research and driving the development of new medical treatments. One of the most promising examples of this research which is built on the strengths of CMC and UNC Charlotte is known as Translational Research. Translational research refers to the process of transitioning bench scale medical research to clinical application. One example is research that addresses the treatment of diseased or injured livers. UNC Charlotte has four scientists studying different aspects of injured livers and bioartifical devices to support liver function while awaiting transplantation. CMC is home to a robust liver-biliary-pancreatic disease center comprised of eight medical staff and eight researchers focused on liver injury and transplantation. Both organizations are committed to the development of a strong collaboration and continue to expand their research partnership.

translational research



CBES

The Center for Biomedical Engineering Systems (CBES) at the University of North Carolina at Charlotte synergizes the expertise of our researchers to advance biomedical engineering research, development, and practice using a systems approach.

Established in 2005, CBES serves the Charlotte metropolitan area by providing the infrastructure to enable biomedical faculty, researchers, clinicians, practitioners, and students to collaborate on solving biomedical issues. The CBES team approach to problem solving is critical, since the complexities of biomedical issues require interdisciplinary and collaborative efforts to make optimal advancements. The CBES research team currently consists of 42 affiliated researchers distributed across four Colleges of the University (the Colleges of Engineering, Liberal Arts & Sciences, Health & Human Services, and Computing & Informatics), and in the greater Charlotte area (OrthoCarolina, Carolinas Medical Center, and Presbyterian Hospital).

Through the efforts of our three focus areas - Medical Therapies and Technologies (MTT), Biomechanics & Mobility Research (BMR), and Molecular Engineering & Design (MED) - CBES annually supports biomedical research, workshops, seminars, conferences, and other events. Some of their recent highlights include CBES Researchers Dr. Dennis Livesay and Dr. Donald Jacobs being awarded a contract with MedImmune Inc. (of Gaithersburg, MD)- a subsidiary of AstraZeneca for a pilot study entitled: “Antibody Fragment Stability: A focus on domain-domain interactions”. The project is just one example of researchers of CBES’ MED focus area using their strengths and in simulating and manipulating macromolecules and protein biophysics, to advance biomedical research.

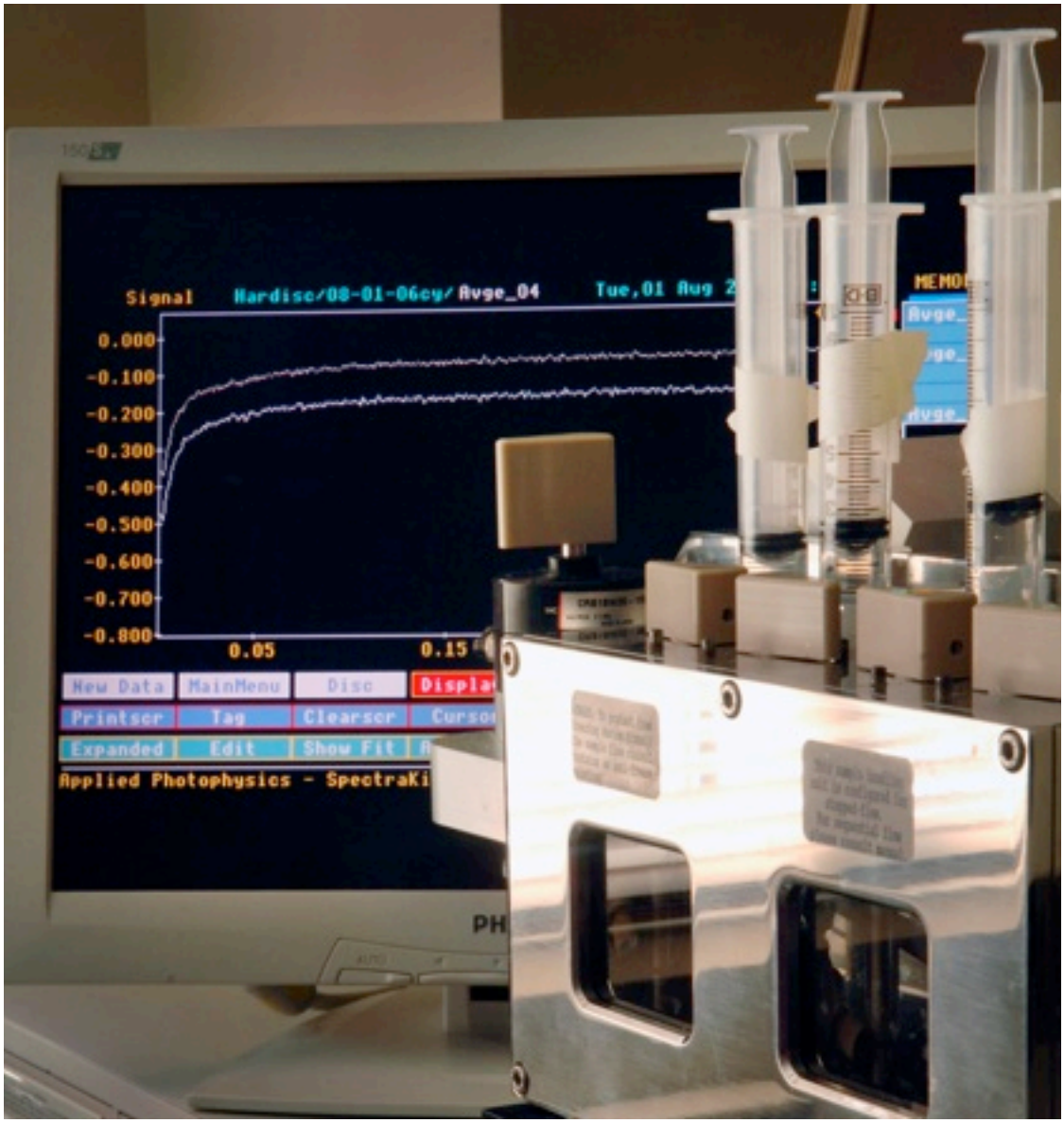
Another collaborative team consisting of CBES researchers Dr. Andrew Willis (of UNC Charlotte), Dr. Richard Peindl (of Carolinas Medical Center) and the leader of CBES’ Biomechanics & Mobility research focus area; and Dr. Jim Kellam, head of Traumatology at CMC – are working together to make it possible for Dr. Willis’ 3 D reconstruction software to be used in pre-operative planning at Carolinas Medical Center. This project has the potential to enable the orthopedic surgeons to use the software to visualize the reconstruction of

complex three dimensional bone fractures. Thus, this project is expected to directly benefit patient care.

In the latest events scenario, CBES and CRI cosponsored the 3rd Annual Graduate Poster competition on April 8th, 2011 at Woodward Hall on the UNC Charlotte Campus. Graduate students from UNC Charlotte participated and competed during the event. Topics ranged from simulations of the force of impact during automobile crashes to strategies for designing safe cryopreservation protocols for 3-D tissues to understanding the roles of hydrogen sulfide in liver dysfunction. The overall winners of the 3rd Annual CBES Graduate Student Poster Competition were, Andrea Murphy (1st Place Overall Winner- $600) for her poster "Vesicular Stomatitis Virus as an Oncolytic Agent Against Pancreatic Ductal Adenocarcinoma." The 2nd Place Overall Winner ($300) was Gengbei Shi for his poster "Computational Prediction and its Validation of a Novel Liver Bioreactor's O2 Distribution."

This year the CBES Leadership Team added another dimension to the competition, where the remaining graduate student competitors, if they are of laboratories in which the advisor is also a CBES Affiliated Researcher, were eligible to be considered for $250 awards as winners in the CBES Focus Area with which their advisor is associated. The 3 Focus Area winners of this year's competition were Pengcheng Li for his poster "Computational Analysis and Reconstruction of 3D Comminuted Bone Fractures" from the Biomechanics & Mobility Research (BMR) Focus Area; Eric Norris for his poster "The Liver is a Critical Site for Hydrogen Sulfide Clearance in Sepsis" from the Medical Therapies & Technologies (MTT) Focus Area; and Charles David- for his poster "A Model Comparison for Characterizing protein Motions from Structure" from the Molecular Engineering & Design (MED) Focus Area.

For more information please visit: http://cbes.uncc.edu



UNC CHARLOTTE business partner ADVERTORIAL

In early April 2011, a new business was "spun out" from UNC Charlotte's College of Computing and Informatics and the Software Solutions Lab. 411fit LLC, a commercial health and wellness web based venture developed by a team of UNCC based software and data analytics experts entered the fast growing web based services market. In 2006, the University was quick to endorse the vision of Dr Mirsad Hadzikadic and David Wood, a UNCC software developer, that was built on emerging trends of social networking, fitness performance tracking, nutrition and management of healthy lifestyles. The 411fit team has built a "market ready" software architecture that is both highly flexible but very stable at the same time.

Today, 411fit LLC has over 28,000 registered users across universities, corporations and community organizations. With Angel Investors' funding, 411fit expects to rapidly expand the user base by focusing on organizations with active wellness management programs that are looking for major improvements in the design and management of cost effective employee wellness programs.

For information visit: www.411fit.com

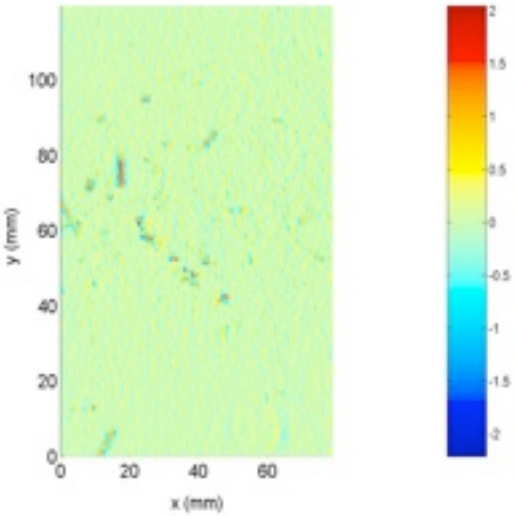
UNC CHARLOTTE business partner

ADVERTORIAL

Albany Instruments Inc. develops new probes and methods for eddy current testing and imaging of electrically conductive materials, parts and structures. By using the emerging giant magnetoresistive technology and advanced design techniques, Albany's products and services enhance the capabilities of eddy current testing technology currently existing in the market.

Albany's field of activity is focused on the detection of defects, such as cracks and corrosion in metallic structures. Cracks in airplane wings, disk engines, or wheels are critical in airplanes, while corrosion and cracks in heat exchangers, steam generator tubing and turbine blades must be detected in nuclear power plants. The company offers a unique solution to an important problem of the aircraft industry: the detection of deeply buried cracks in multi-layer structures, around fastener holes.

For more information contact Dr. Teodor Dogaru at 704-408-3997 or at tdogaru@hotmail.com



GMR sensor output from scanning a carbon steel sample containing minute surface defects.

UNC CHARLOTTE business partner ADVERTORIAL

Connectivity Concepts

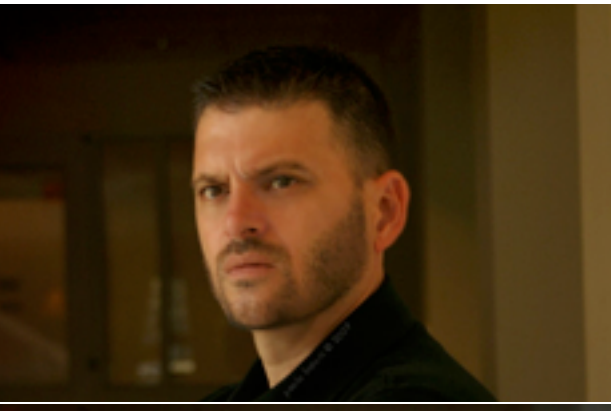
Connectivity Concepts, LLC is a developer of fully integrated, fully functional healthcare and life science enterprise solutions. Located in the Bioinformatics Center on the Charlotte Research Institute Campus of UNC Charlotte, the company's founder has over 20 years of healthcare and life science experience. Connectivity Concepts provides solutions built by patients, physicians and scientists to improve the quality of care in the healthcare delivery system. Our solutions are receiving rave reviews from the market place because of their functional flexibility and ease of use. Customers are experiencing a dramatic improvement in their practice efficiencies and workflow with a rapid return on investment. Our solutions are personalized to each practice, provider, hospital and consumer. Our seamless and mission critical healthcare solutions are easy to setup, administer and use. We are also developing other innovative products to enhance any enterprise solution, as we continue to work close with our physician and academic partners. As a B2B service provider, we also support the education and training, setup and conversion, and adoption and sustainability of any EMR/EHR platform. We help you avoid the pitfalls.

Our enterprise solutions allow comprehensive management of medical information in the cloud with a secure exchange between healthcare consumers and providers. Broad use of this technology will improve healthcare quality and patient satisfaction. It will also help to Increase productivity, prevent medical errors, reduce healthcare cost and increase administrative efficiencies. Connectivity Concepts goal is to use the latest advances in technology to develop intuitive, scalable and robust solutions that enable the healthcare delivery system to operate more efficiently while improving patient satisfaction.

For more information visit www.connectivityconcepts.com, call 704-687-5004 or visit the Bioinformatics Building, Room 208 on the UNC Charlotte campus

UNC CHARLOTTE business partner ADVERTORIAL

dot metrics technologies



Dot Metrics Technologies is a small, innovative company developing high performing UV disinfection systems for air, water and surfaces. The company is located in the Charlotte Research Institute in Charlotte, NC. Our broad-based industrial experience provides the agility and expertise to pursue high risk technologies and translate these technologies into commercially viable products. Dot Metrics' strategic corporate alliances allow both Dot Metrics and our partners to rapidly translate the company's unique LED expertise and intellectual property portfolio into new products that are highly desired.

For more information visit:

www.dotmetricstech.com

HEPATOSYS INC.

With the goal of developing laboratory research into clinical applications, two UNC Charlotte researchers formed HepatoSys Inc. in 2005. The spin-off company was started by Dr. Charles Lee of Mechanical Engineering and Dr. Mark Clemens of Biology. The primary focus of their company, which now employs four technicians, is the recovery of organs for transplant.

"We had a very productive collaboration going," Dr. Clemens once said, "and the research developed to the point where we realized if the technology was ever going to be available for patient use, it had to be developed by a private enterprise. So, we took the next step and formed the company." Since its inception, HepatoSys has won $1.8 million in grants from the National Institutes of Health. The translational research funding is specifically aimed at taking research from the bench top to clinical use. "Our primary research is that we have discovered a way to revive and resuscitate organs from marginal donors," Dr. Lee said. "This category of marginal donor organs is known as donation after cardiac arrest. We have shown we can recover such organs using low temperature machine perfusion."

In machine perfusion, a liquid solution developed by the UNC Charlotte researchers is pumped through the donated organ. By using this technique, it is estimated the pool of useable organs for transplant could be increased 20 to 40 percent. "Currently, an organ can't be used after the donor has been dead more than 20 minutes," Dr. Lee said. "We have extended that to an hour in an animal transplant model." An important aspect of the research is assessing the viability of the machine perfusion organs. An assessment microscopy system that can evaluate organ function is being built to do just that.

HepatoSys, Inc. is dedicated to improving patient outcomes by expanding availability of viable organs for transplantation through innovative engineering technology. This would be accomplished by improving the recovery of Donation after Cardiac Death Organs. We currently have two product lines:

1) New Hypothermic Machine Perfusion Solution

2) Viability Assessment Device

The Scientific Team is composed of two Scientists and three technicians. Drs. Mark Clemens (Physiologist) and Charles Lee (Biomedical Engineer) have over 40 years of research experience with over $10 million of funding. Since its inception, HepatoSys, Inc. has received almost $2 million from the National Institutes of Health to develop the company's products. "We're developing an optical technique that can monitor the recovery of tissue metabolism in the organs," Dr. Clemens said. "The device is noninvasive and functions at low temperatures. It provides us with continual readout of metabolic recovery to see if the organ is viable."

For information visit: www.hepatosys.com

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The University of North Carolina at Charlotte Institute for Social Capital, Inc. is an innovative new initiative created to foster university social and human capital research and to increase the community's capacity for data-based planning and evaluation. The Institute for Social Capital was created to serve as a vehicle for collaboration with local and regional non-profits, government agencies, and community-based organizations and to develop a means for compiling, validating and analyzing community data.

The Institute for Social Capital is in the process of building and housing a comprehensive database of de-identified, local social and human capital data. By connecting dispersed data sets, the database will provide a foundation for building an understanding of the social and environmental variables that affect the community - particularly outcomes for children and families. The ISC database will serve as a basis for analysis and research in the community and at the university.

For more information visit: http://socialcapital.uncc.edu

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North Carolina Biotechnology Center

Founded in 1984 by the legislature as a private not-for-profit organization, the North Carolina Biotechnology Center's mission is to provide long-term economic and societal benefits to North Carolina through support of biotechnology research, business, education and strategic policy statewide. NCBC awards grants for education and biotechnology workshops. We partner with economic development agencies to retain, expand and attract companies. NCBC grants support research, star-faculty recruitment, public/private collaborations and scientific equipment purchases. As biotechnology is homegrown, we help commercialize innovation with various programs for start-ups, including funding. NCBC is proud to call UNC Charlotte's Charlotte Research Institute, where innovation abounds, home.

For more information visit www.ncbiotech.org, call 704-687-8563 or visit the Bioinformatics Building, Room 203 on the UNC Charlotte campus

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Photonic Discovery LLC

PHOTONIC DISCOVERY LLC

Photonic Discovery LLC is a new product development company that provides support to our clients through research, project management, and idea development in the field of optics, optical communications and the emerging field of metamaterials. Our team at Photonic Discovery brings over 14 years of industry experience in optical manufacturing, testing, and operational instruction on the most current technology connected with fiber related optical communications. Being intimately connected with the University of North Carolina at Charlotte, we can provide access to unique resources and individuals that will help intellectual property owners realize their product's potential. Photonic Discovery LLC, working with our partner organization, Piedmont Product Development LLC, can provide your company with a commercialization strategy from concept to manufacturing.

For more information visit: www.photonicdiscovery.com

soymeds

Soymeds is a biotechnology company focused on the development and validation of soybean-derived therapeutics that can be used to prevent, treat, cure and diagnose disease. The company was co-founded in 2005 as a spin-off from the Department of Biology at UNC Charlotte by Drs. Ken Piller (plant biology) and Ken Bost (immunology). SoyMeds has developed a platform technology to target expression of protein-based therapeutics to soybean seeds. SoyMeds' therapeutics can be processed into soymilk formulations or easily purified if necessary. Focus areas for R&D include immunomodulatory proteins (e.g. vaccines, antigens, toleragens) and analytical reagents (e.g. components of diagnostic kits). Competitive advantages of SoyMeds' technology include bioequivalency, lower costs, simplified purification and storage requirements, elimination of a cold-chain, and a green technology. The company has five employees, several patents/applications, > $1.5M awarded in NIH SBIR/STTR funding, and welcomes discussions with potential industrial and pharmaceutical partners.

For more information contact Ken Piller (kjpiller@uncc.edu) or Ken Bost (klbost@uncc.edu)

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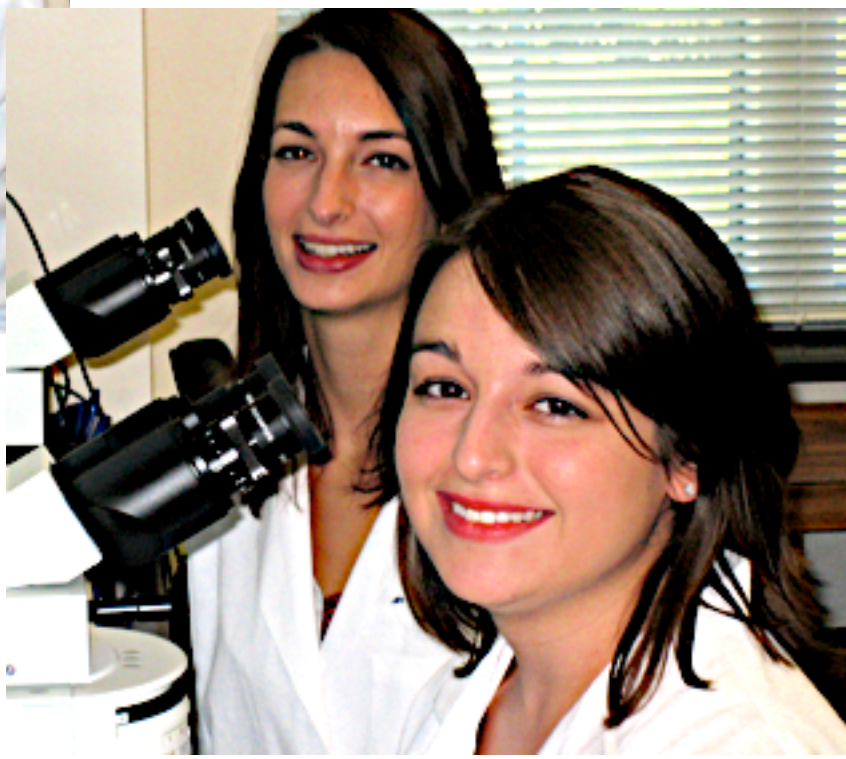
V-Bio is a small biotechnology spin-off company founded by two faculty members from Saint Louis University based on intellectual property developed in the University setting. V-Bio began by measuring antibodies in a novel way against vaccines being developed for biodefense. Subsequently, the company expanded to provide quality antibody assays and viral cultures in support of clinical trials for new vaccines. The company recognizes the importance of blending academic research experience and expertise with the need for commercial rigor, strict adherence to client time lines, and high throughput assays.

Frances K. Newman, MS (ASCP) is President and co-founder of V-Bio. She is a specialist certified in virology research by the American Society for Clinical Pathology with more than 30 years experience in research and diagnostic techniques in virology and immunology. Products developed include a live attenuated vaccine for croup and pneumonia in children.

Robert Belshe, MD, co-founder of V-Bio and Professor in the Department of Internal Medicine at Saint Louis University is an expert in both clinical infectious diseases and laboratory science, including developing diagnostic methods and treatment methods for viral diseases. Dr. Belshe is internationally known for his leadership of pivotal studies in developing live attenuated influenza vaccine.

For more information visit: www.v-bio.com



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World Affairs Council of Charlotte

The World Affairs Council of Charlotte (WACC) was founded in 1983 as an outreach program of UNC Charlotte and its Office of International Programs. As a non-profit, non-partisan organization, it is supported by private funding from individual and corporate member dues and contributions. As a regional center for education and discussion of world affairs, the Council seeks to provide leadership for global thinking, believing that a broad perspective is necessary for effective competition in the global economy and for responsible citizenship in an increasingly interdependent political world.

For more information visit: www.charlotteworld.org

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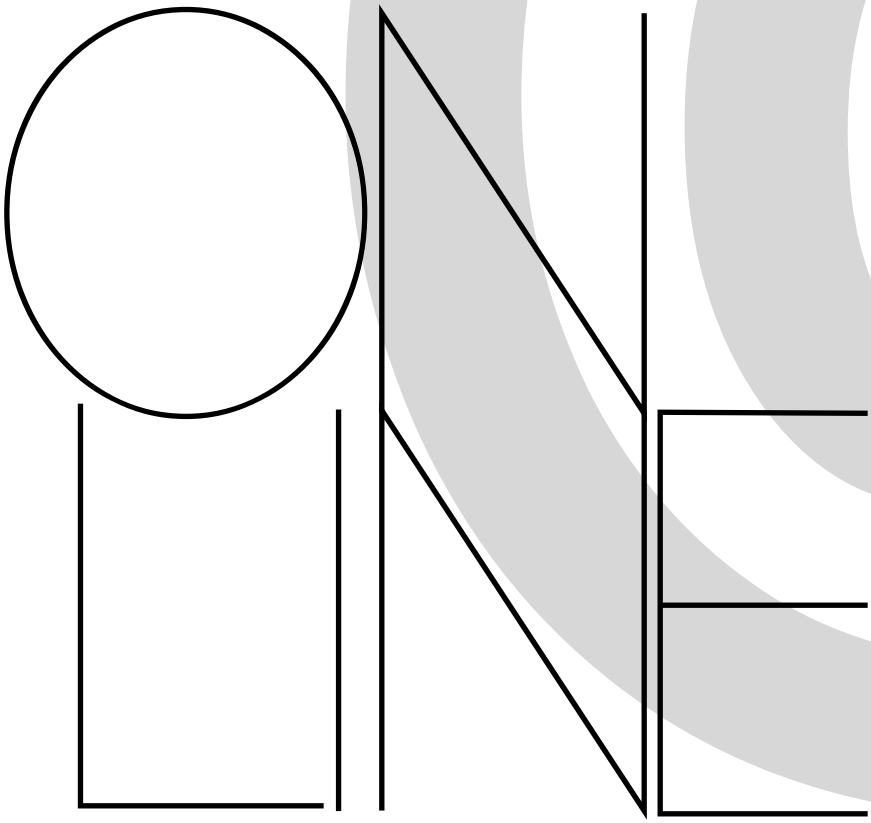

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